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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLII. No. 3004.] LONDON, DECEMBER 8, 1920. [72nd Year. Price 8d.

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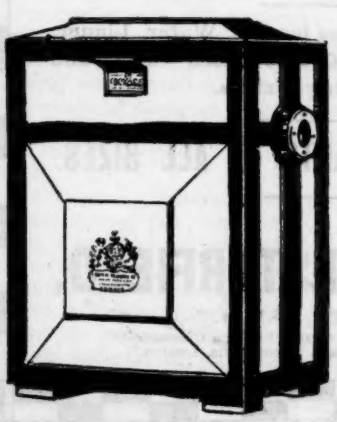

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLII., No. 3004.] WEDNESDAY, DECEMBER 8, 1920. [72ND YEAR.

EDITORIAL NOTES.

Private Gas Bills for Next Session.

THERE will not be great rejoicing among Parliamentary Agents and members of the Parliamentary Bar over the Private Bill prospects of the next session of Parliament, if any fair indication of prospects is given by numbers. The list of notices for Private Bills only figures-up at 82, compared with 114 last year, although, of course, the number may be enlarged if the Standing Orders Committee graciously consent to the suspension of the Standing Orders in the interest of any late comers. But the gas industry is not, compared with recent years, making a bad contribution to the work at Westminster, as the Parliamentary Notices in this and the two previous issues of the "JOURNAL" have disclosed; and on top of these there is the work that will be done through the Board of Trade under the Gas Regulation Act, the part of which work that may need outside assistance being, of course, an unknown quantity.

The notices for Gas Bills, as will have been seen, contain the traces of modern development, consolidation, and change —"traces" of proposals being all that is required in these particular formalities. Considerable interest is foreshadowed. Some of the promoters, having other matters for which they desire to approach Parliament, are including the heat-unit change in their Bills. In some of the notices, however, we see nothing that could not equally well have been secured by way of Special Orders through the Board of Trade, though the option of procedure is, of course, with the promoters. Other notices do not indicate with any degree of certainty whether or not the promoters are intending to put themselves on the new thermal basis; but we should imagine that, wherever charges or gas quality are dealt with in the Bills, Parliament will insist upon the new order of things applying, if the gas industry is to make the change as promptly as possible. Companies and local authorities alike are asking to be put on to the new thermal basis—for example, the Cardiff, Harrogate, Swansea, Tendring Hundred, and Wandsworth, Wimbledon, and Epsom Companies, and the Wigan Corporation and the Spenborough District Council. From the wording of the notices, it is clear that Cardiff, Harrogate, and Swansea are taking as their model the South Metropolitan plan of a basic price and of profit distribution below the basic price, which does away with the old sliding-scale, provides a minimum dividend, and when the charge for gas per therm is below the basic figure, the ordinary stockholders and the employees share with the consumers in the results of good working and trading. In asking for this change, the applicants are on good ground with the South Metropolitan precedent to support them. It is observed that the South Metropolitan Company are now making new provision as to the form in which their accounts are to be made up. Change begets change. They also propose amending existing enactment in respect of the purity of the gas supplied. Exactly what this means is not yet known.

Another imposing feature of the notices will create lively anticipation among the plant makers. In respect of consolidation of gas manufacture and extensions of areas, there are notable examples of this growing policy, which, it will be remembered, is largely favoured in section 10 of the Gas Regulation Act. The Manchester Corporation Gas Department (who are contemplating taking over the Stretford Gas Company's undertaking) are preparing for a tremendous works scheme, which will, we believe, involve the expenditure of something like 1½ millions of money. The works contemplated will have a capacity of 30 million cubic feet per day, which on a 500 B.Th.U. basis would mean 150,000 therms. The site has an area of 160 acres, and is in proximity to the Partington coal basin. Leicester and Waltham Abbey have also plans for new works. Extensions of areas and purchases likewise foreshadow works' enlargements, re-arrangements, and manufacturing consolidation. The Wandsworth, Wimbledon, and Epsom District Gas Company are proposing the absorption of the Sutton Gas Company. The Hoylake and West Kirby District Council are desirous of becoming the owners of the local Gas and Water Company. There is a proposal in the Radcliffe and surrounding district to form an authority to supply gas to a large area, taking over the Radcliffe and Pilkington Gas Company's property and business as the nucleus of the scheme. The Spenborough District Council are planning the acquisition of the Heckmondwike and Liversedge and Gomersal Gas-Works. The Swansea Gas Company are looking out for amalgamations, purchases, or the leasing of gas undertakings, or entering into working arrangements with them. There is also St. Helens seeking additional powers in respect of the working-up and manufacture of bye-products. Several gas undertakings are applying for authorization to supply power gas, which is a proper thing in these days when new competition is arising (supplementing that from producer and suction-gas plant) in this direction from low-temperature processes. Gas undertakings must not allow the limits for enlarging business to be reduced more than is unavoidable. Further undertakings are applying for powers to purchase coke-oven gas.

With regard to finance, large additional capital powers will be sought, and revision of existing authorization to enable money to be raised in these times when the interest and security desired by investors are not what they once were. The Leicester Corporation Gas Department want authority to increase the amount which they may set aside for the works renewals fund, which is a proper thing when plant, materials, and labour cost so much more than formerly. It will be interesting to learn what is meant by a provision the Nelson Corporation are desirous of obtaining, which would authorize the payment of "the revenues " of the Corporation including the revenues of their several " undertakings, into one fund." The right to make differential charges is being freely sought. Probably the Gas Companies' Protection Association will investigate the proposals of the Thames Deep-Water Wharf and Railways Company, whose notice was the subject of a paragraph last week [p. 528]. The interests of gas companies may require an amount of protection in this instance.

We have only brought into view here some of the salient features of the notices; but they show that interest will emanate from the Bills, as well as from the applications that are being made to the Board of Trade under the Gas Regulation Act.

An Electrical Engineer and the Price per Therm.

IT is highly interesting to find an Electrical Engineer concerning himself in the question of the price per therm which his gas competitors are proposing not to charge, but to adopt as a standard for the regulation of the dividends on their ordinary stocks. Of course, if the standard price per therm was the one that the competitors intended to charge, the interest in it of an electrical engineer would be very natural. The Chief Electrical Engineer of the Borough Council of St. Pancras has been considering the application of the Gas Light and Coke Company to the Board of Trade for a standard price per therm of 1s. 3·6d.; and, believing it to be desirable that some "information" should be available for the General Purposes Committee of the Council, he has

accordingly reported. In his opinion, the notice from the Company conveys no useful information, as it does not give the calorific value of the gas supplied. The calorific value of the gas per cubic foot has got precious little to do with the standard price per therm. For the actual price charged per therm, whatever it is, the consumer will receive 100,000 B.Th.U.—no matter what quantity of gas has to be delivered to ensure the therm being put into his possession. The standard price per therm is the datum-line from which, under the sliding-scale, increase and decrease of dividend will be calculated according to the place occupied by the actual price charged per therm in relation to the datum-line.

However, in seeking to "inform" the Committee what the 1s. 3·6d. per therm means, the Chief Electrical Engineer of St. Pancras has made inquiries; and he finds that the average calorific value for the September quarter was 491 B.Th.U. So 204 c.ft. are equal to 1 therm. Having revealed this most abstruse fact, he finds that, whereas the standard price is now 3s. 2d. per 1000 c.ft., it will be under the new order of things 6s. 4½d. per 1000 c.ft. There is nothing remarkable about that. It is only about 100 p.ct. increase; and as a buyer of coal, plant, materials, and an employer of labour, he knows full well that they have not stopped at 100 p.ct. advances. The Company's standard dividend is only 4 p.ct. at the proposed standard price per therm; and there is therefore something allowed for in the 1s. 3·6d. to enable a lower price to be charged, so that the difference will, by the aid of the sliding-scale, restore to the stockholder at any rate his pre-war dividend. Has the Chief Electrical Engineer any objection to this that he would care to claim is backed by justice? We think not. The actual price per therm to the consumer must, if the markets for plant, materials, and labour will allow, be kept well below the 1s. 3·6d. per therm if the pre-war dividend position (which was not a grand one) is to be restored. There is another point on which the Chief Electrical Engineer is not very clear. Admitting that if the Company should obtain sanction to the standard price per therm asked for, it does not follow they will charge it, he says the General Purposes Committee ought to know that the Company would then secure the power to increase the price of gas in this way to that figure. It is a great pity the Borough Council did not seek competent guidance in this particular matter. There is no occasion for the Company to stop the charge to the consumers at that price. If they reach it, they will only be getting the standard dividend of 4 p.ct. There is no limit to the price to which they may go above the 1s. 3·6d.; but as the price goes above it, the dividend on the ordinary stock would simply decline until a point arrived when it would be altogether illegal for the Company to pay any dividend at all.

Another interesting piece of "information" is that "in "the old system of measuring per cubic foot, the gas might "be diluted with a large percentage of air, which would re- "duce the heating value considerably, and yet the consumer "would pay for the air measured instead of the gas. This "with the therm measure is not so likely to occur." So under the old system of measurement, it was "likely" to occur. Evidently our friend has not a high opinion of the honesty of gas companies; but he may take it from us that they are not in the habit of deliberately "diluting" their gas with a "large" or any other percentage of air; nor are they very keen on wittingly producing oxidation in their distribution plant and apparatus. The gas is tested daily at several testing stations of the London County Council, under statutory authority; and under the new order of things, at each station a continuously recording calorimeter will be employed to see that the "declared" calorific value is constantly supplied. One thing we miss from the report of the St. Pancras Electrical Engineer is that he does not inform the General Purposes Committee that to put into the possession of electricity consumers the potential value of a therm, 29 units of electricity would be required, which, at (say) 2d. per unit, would mean 4s. 10d. per therm! When the Committee know this, they will probably look upon 1s. 3·6d. per therm as an extraordinarily modest price, which price the Company will not, in the interests of the stockholders, charge unless compelled.

Lord Newton and Smokeless Domestic Heating.

WE are not by any means in sympathy with those people who think that all recommendations that are made by Departmental Committees should be adopted and enforced. Sometimes Departmental Committees are curiously constituted, and, when their constitution is examined, it is clear that their recommendations should be narrowly investigated before effect is given to them. Occasionally they are found overweighted with one particular intellectual, professional, or industrial element. A Committee may, for instance, be composed entirely of physicists or chemists with superlative knowledge in their own particular walks, but who may lack even a nodding acquaintance with industrial problems and practice. Or a Committee may be constituted practically entirely of men who are concerned with a particular industry; and their recommendations may be of an order that takes no account whatever of whether or not they are detrimental to the interests of other industries or to those of national economy. So long as, in such a case, their own industry gets exceptional facilities for reaping new advantage, nothing else appears to matter. Examples readily come to mind. There was the Home Office Committee that twenty years ago considered the question of the limitation of carbon monoxide in town gas, and whose recommendations, if adopted, would have been a permanent drag upon the gas industry and its public service. Most fortunately, they were not adopted; and experience has proved that the fears of the Committee were as absolutely groundless as were those of the nervous folk who over a hundred years ago expected that the carrying of gas in mains under streets would result in continual explosions, and would make the streets places of daily danger to life and limb. We are not without such people to-day. There are men who hold up their hands in horror—perhaps it is well-feigned horror—at the thought that carbon monoxide should not be statutorily restricted, and who refuse to give heed to the lesson that the long, ever-widening roads of experience offer them. Every time the test of experience is applied, their advocacy and fears are unsupported, and meet with disaster. The electric power investigations supply examples of Committees whose suggestions came from the strong interested elements upon them, and who sought preferential consideration for electricity through presenting (on paper) untold benefits, which failed to stand tests easily applied but irrefutable. It would have been much better if these particular inquiries had covered the whole field of the utilization of our coal resources for the provision of light, heat, and power (as suggested by Sir Arthur Duckham), so as to have made a comprehensive job of the question, irrespective of agent or industry.

On the other hand, there are Departmental Committees properly constituted in respect of qualification, and whose recommendations have the support of experience and practical utility, and should therefore be advanced with all the energy and influence the Government are able to exert. Such a body and recommendations are found in the Departmental Committee appointed by the Ministry of Health to investigate the problem of smoke and noxious vapours abatement. Over this Committee, Lord Newton presided; and now he is far from pleased with the (in his opinion) unsatisfactory manner in which the recommendations of his Committee have been brought to the notice of those who are responsible for the carrying-out of housing schemes. He called attention to the matter in the House of Lords last week; and his speech showed that he at all events—the recommendations of his Committee having received the approval of men who have made a long and critical study of the waste and harm done by the burning unnecessarily of crude coal—is not prepared to be content with the work of his Committee only being crowned by the modicum of practical result which a feeble circulation of the Committee's proposals may produce. As he truly points out, the housing schemes offer a unique opportunity for bringing about reform in respect of the curtailment of domestic smoke; and this phase of the great problem should be pushed with the seriousness which is warranted by its importance from the national health and house economy and convenience points of view. His Lordship would go the length of the Government imposing certain restrictions in respect of crude coal consumption in the case of all houses which have been granted building subsidies.

Readers of the "JOURNAL" know the nature of the Committee's recommendations; and they are cognizant of the demonstrable fact that certain of them can be carried out in the housing schemes with an economy in structural expenditure which will more than cover the provision for reformed methods of obtaining and applying heat. There is double reason therefore—economy and smoke abatement—underlying the annoyance of Lord Newton over the absence

of an energetic campaign among the housing authorities, and real action on the part of the Government which would ensure effect being given to the recommendations—recommendations made honestly, disinterestedly, and with constructive objects in view, and not merely because a report of some kind had to be made. Dilatory action and negligence (or what almost approaches it) are not regarded by Lord Newton as a compliment to him and his colleagues on the Committee. As he travels through the country, and sees houses springing up with the same old-fashioned chimney stacks and pots as plentiful as ever, the labour of his Committee naturally crosses his mind, and so does the question "*Cui bono?*" We found no sufficient answer in Lord Sandhurst's reply to his strictures. The circulation among housing authorities of an abbreviated account of the report in the Government publication "Housing" is inadequate; it wants something more direct, trenchant, and effective—if the Ministry really desire to ensure good through the present exceptional opportunity. There is promise of the issue by the Ministry of a special memorandum on the subject. Lord Newton is going to see the nature of the memorandum, before he will be prepared to say that he is satisfied. If satisfactory then, the memorandum will not be an effective instrument for all time; and the Department will have to peg away again and again in what is a good cause. Custom will not fall at the first attack; and no good cause meets with thorough success without persistent effort. It is clear that Lord Newton has no intention, so far as his position and power can be utilized, to allow the report to remain a dead-letter, or to become fresh stuffing for a Departmental pigeon-hole. His Committee still exist. Their work is not finished. But their interim report was issued for securing the maximum and not the minimum effect. It is the former, and not the latter, that Lord Newton is after.

Gas Chemists—Opportunities for Training.

THE chemist to-day is an indispensable part in the personal organization of a gas-works. He is the person best qualified to maintain by his tests the economy and efficiency of processes. No gas-works that can afford an independent and fully qualified chemist should be without one; and those works that unfortunately cannot afford one should, on making new appointments, lay it down as a needed qualification of engineers and managers or assistants that they must be capable of carrying out the ordinary controlling chemical tests associated with the processes of the works. Gas-works operations offer a large scope for the useful services of chemists. More are being appointed to-day than ever; and more will be needed. Everything in the industry's development points to this; and the claims of efficiency and economy insist upon it. There is good, sound, concisely-put reasoning in the discussion by Mr. Frank B. Small, through the paper he read last Saturday before the Manchester Junior Gas Association, of the training that those should receive who aspire to responsible positions as works or research chemists and assistants. There are no criticisms to be passed on his formulæ for the qualifying of men for filling different posts in the chemical departments of gas-works. The training must be a double one. No man can succeed as a works or research chemist in the higher positions, whose training does not include a thorough knowledge of the general principles of chemistry, which are usually packed under the one word "theory." Men without this knowledge are next to useless, or only fit to perform the work of assistants under competent supervision.

While we are not proposing to traverse the courses of chemical training that Mr. Small discusses and proposes, there is one point which strongly appeals to us. Mr. Small would like to see all youths, who show inclination or aptitude in this direction, given a chance. We are certain that much brain power and skill have been lost to the professions, and result to the industries and the country, through qualification being largely a question not of intellectual capacity, but the depth of the parental pocket. Even Universities like Leeds, where (as things go) modest fees prevail, are barred, owing to the lack of opportunity and means, to not a few who would, given proper training, make skilful workers; and technical schools are not available in all towns for the youth who is a keen searcher after knowledge. Some of our cleverest chemical workers are from Universities like Leeds, Manchester, and Birmingham, where the training is with the view to completing on the works qualification for posts in the industrial world. But some of the most distinguished men in the chemical and other sciences have, through parental inability to do more, derived their rudimentary knowledge from putting-in "overtime" at technical classes. These are gifted men; but the inspirations of after-life only came from the gratifying of early desire in the only possible way they could do it. There is no definite limit to the development of a man's work in this or any other direction, if his education (no matter its source) inspires him, and the opportunity offers, to realize higher things. Naturally for all men the larger and more complete the training, the better.

So in us, as in many others, Mr. Small has sympathetic supporters of the part of his paper where he expresses regret that neither the Board of Education nor Education Committees have provided for, or even encouraged, outlets for the great number of juvenile workers derived directly from the Public Elementary Schools. Every encouragement, he holds, should be given to those young persons to seek advancement. We agree. Parental money has not a monopoly of brain power, nor therefore should it have, any more than family relationships, a privileged claim to, or priority in, position. The title should surely come from some other cause. How is encouragement and opportunity to be given to aspirants for advancement who show the necessary ability? Mr. Small, in two or three sentences, supplies an answer: "Much could and would be done in "this direction if the directors and committees of private "and public gas-works would bring some pressure to bear "on national and local educational authorities, and (showing "a good example) would endow scholarships with maintenance for the brightest of their workers. What a magnificent thing if but one scholarship were founded for each "works!" It would be a magnificent thing. But gas undertakings who did this would desire to have prior claim on the result, if it were worth having. The suggestion was put forward for consideration. We hope it will receive it; and we should like to see some gas undertakings move in giving effect to it.

Meter-Size Nomenclature.

It has long been recognized that a new method of designating the sizes of meters is required. The greater part of the consumption of gas to-day has very little to do with "lights;" and the antiquated meter-size nomenclature has therefore very small relation to gas demand. The Consumers' Meters Committee of the American Gas Association suggest that meter sizes should now be expressed on the basis of hourly gas-flow.

Fertilizer Demonstrations.

It is remarked that the Ministry of Agriculture are appointing a temporary Director for the organization of a scheme for the demonstration throughout England and Wales of the value to farmers of the proper use of recognized fertilizers. The candidates for the post are to have an adequate agricultural and scientific training, with experience of modern methods of publicity. Looking at the value of money to-day, the qualifications required, and the fact that the whole time of the Director will be required for his responsible task, the salary of £1000 a year is not a lavish one. A long experience of work of this kind was the possession of the now defunct Sulphate of Ammonia Association; but we are sure their successors, the British Sulphate of Ammonia Federation, will be only too pleased to render the new Director, whoever he may be, as much assistance as possible in his educational efforts.

Good Work at the Coal Mines.

The coal miners are now giving evidence of what they can do. They were showing it before, but not in a way that was serving the interests of the country. In both directions, they have demonstrated their power of control over output; but now they are doing it in a manner which, if persevered in, will greatly assist the country, and incidentally preserve their position in regard to pay. The output of coal during the week ending Nov. 20 is the best since May 31 last year, and the "best" was for the week ending April 24 last, when the production was 4,989,666 tons. For the week ending Nov. 20, this figure was exceeded—the output being 5,210,700 tons. This is not the limit of production with the number of persons employed; and it is hoped the figure will still advance. An interesting comparison of the output and the

number of persons employed during the completed three quarters of this year are as follows: For the quarter ending March, the output was 62,103,000 tons; and the average number of persons employed 1,188,500. For the quarter ending June, the production was 58,166,000 tons; and the persons employed, 1,200,300. For the quarter ending September, the output was 59,467,000 tons; and the number of persons employed, 1,207,800. In every coal area progress was registered. We see that a new Order has now been issued which frees the trade in export coal from all restrictions hitherto imposed affecting prices and conditions of sale. The quantity and description of coal which may be exported or supplied for foreign bunkering remains subject to the existing restrictions.

Honest Effort and its Reward.

Referring to the gratifying increase in output, the Coal Association say it is a matter for congratulation all round, though it has been achieved first and foremost, of course, by the application of honest effort on the part of the miners. If this rate continues, the miners, in addition to the 2s. already earned, will be entitled to a further advance of 1s. 6d. per day as from Jan. 1 next, under the terms of the recent settlement. It is in no spirit of ingratitude that one reflects how this great result has been brought about without any alterations in the equipment of the mines. Yet certain of the miners' leaders have for months been asserting that low output was due, among other things, to inadequate and antiquated equipment. It is fair, too, to remark that the increase follows upon the Government standing aside, and leaving coal-mining affairs to be carried on by those whose business it is—the colliery companies and the colliery workers. The extremists' constantly repeated charge, that inferior seams only are being worked until such time as control is removed, also crumbles away in face of the new level of output.

A Well-Deserved Tribute.

With regard to other coal matters, Mr. A. Ray Duncan finally relinquished his post as Coal Controller on Nov. 30; and in the House of Commons last Wednesday, Mr. Bridgeman, of the Coal Mines Department, paid a tribute of high appreciation to the services Mr. Duncan has, in his responsible position, rendered to the country. The gas industry also recognizes with gratitude the value of these services. It was largely due to the earnest work of the late Coal Controller that gas undertakings found themselves so well situated as they were when the strike of coal miners took place a few weeks since. Now Mr. Bridgeman is the gentleman with whom the industry will have to deal; and his valuable work in connection with the Gas Regulation Act brought well above the surface his appreciation of the importance of the position and public duties of the industry. Another interesting point is that the members of the House of Commons regret exceedingly the departure of Mr. William Brace from their midst to take up the work of Labour Adviser to the Department of Mines. From the Labour benches there has been a little snarling over this appointment—not that the Labour members doubt Mr. Brace's capacity for being of eminent service to the Department, but because absence causes them to realize that they have lost a tower of strength in the House. However, in his new position there will be good opportunity for Mr. Brace to give compensation to the country for the transfer of the exercise of his abilities from one sphere to another.

Big Union Amalgamations.

In the labour world, there are movements which have for their objectives the securing of larger power by stronger organization. There has always, for example, been a weak spot in the Triple Alliance—seeing that hitherto the Unions affiliated with the Transport Workers' Federation have retained the power to decide questions of industrial action. Now the scheme has been adopted (subject to a ballot of the members) which will bring about the fusion of nineteen unions in one body, to be known as the Transport and General Workers' Union. If carried through, the amalgamation will place the transport arm of the Triple Alliance on an equality with the National Union of Railwaymen, which has a membership of about half-a-million. Another big trade union fusion has been provisionally adopted; and in this the gas industry is directly concerned. The scheme is for the amalgamation of the National Union of General Workers, the Workers' Union, the National Amalgamated Labour Union, and the Municipal Employees' Union—the aggregate membership of these bodies being 1¼ millions. While on labour topics, we see it has been intimated by Mr. J. H. Thomas that there is another big struggle coming along—how soon or when he does not say. The ground for it is to be a share by the railwaymen in the control of the railways. A few months ago, so he states, the Government realized that the men ought to have a share in the management; and now he hopes the Government will understand clearly that in this matter the men are absolutely united and determined.

Retarding Industrial Development.

The bases of a country's prosperity are industry and commerce; and industry and commerce are the sources of a country's finance. The manufacturers and traders of this country are of opinion that the Government have adopted the quixotic policy of trying to improve the national financial position by burdening industry and commerce to such an extent that these potential money-making resources of the country are seriously hampered and injured. Such a policy can only in the long-run worsen, and not improve, the position of the national finances. The industries of the country are moving, through the Federation of British Industries, in opposition to the Government policy, in the hope that they will see the errors of their ways. The views of our manufacturers and traders were well voiced at a meeting held under the auspices of the Federation last Wednesday, when some 179 manufacturers' organizations were represented. The need was recognized of special direct taxation upon production as a temporary expedient in time of war; but there was a unanimous opinion that, under existing conditions, such taxation is fundamentally unsound, and cannot be continued without endangering the stability of the nation's industries. Upon the Government was urged the necessity for the immediate withdrawal of the "E.P.D." and the Corporation Tax. The conviction was expressed that the taxable capacity of the country has already been exceeded; and in order to secure the stability and development of trade, it is imperative that retrenchment should be immediately effected in Government Departments, and that all policies entailing large national or municipal expenditure should be postponed until the normal resources of the country can provide the revenue necessary for their fulfilment. The Government cannot avoid giving consideration to the emphatic declarations of such an influential body of opinion.

Protecting the Dye Industry.

The Dyestuffs (Import Regulation) Bill has been introduced; and it is hoped to get it through before Christmas. Its object is to prohibit, with a view to safeguarding the British dye-making industry, the importation into the United Kingdom of all synthetic organic dyestuffs, colours, and colouring matters, and all organic intermediate products used in their manufacture. But the Board of Trade are to have the power by licence to authorize, either generally or in any particular case, the importation of any of the materials prohibited. Five representatives of users, five of manufacturers, and three other persons not directly concerned as users or manufacturers are to form a Committee to advise as to the granting of licences. It is proposed that the Act shall continue in force for ten years. It is stated that 90 p.ct. of the British dyemakers and users are in agreement with these proposals; but the anti-protectionists in the House are working up opposition.

The Casale Synthetic Ammonia Process.—In the new Casale process for the production of synthetic ammonia at the Terni plant a catalyzer is used which continues to function despite impurities in the hydrogen and nitrogen gases. An extremely simple apparatus for its employment has been developed; the only raw materials used being air and water. The energy of the falling water is converted into electricity; and the water, in turn, is acted upon by the electric current to produce hydrogen. This is then piped to the apparatus which extracts nitrogen from the air. The process is carried on in a large steel cylinder. The nitrogen-hydrogen mixture is led from the heater, and passed under low pressure into a tube storage cylinder, where it is conducted through the catalytic substance. Here the desired combination takes place. The ammonia thus produced is condensed into liquid form by a refrigerating apparatus, and drawn off from time to time into steel cylinders. It is put on the market in these cylinders.

OBITUARY.

WILLIAM BUGBY.

IT is with feelings of extreme regret that we have to record the death, which took place at Brighton, on Sunday, Nov. 28, at the age of 69, of Mr. William Bugby, late Manager of the Brentford Gas Company's Southall Works. In his younger days he was Assistant Manager at Brentford, and was eventually appointed to Southall, which position he held for some thirty years. On his retirement a few years ago, he was presented with a handsome testimonial from his colleagues, as a mark of their esteem.

During the time he was at the Southall works he superintended the carrying-out of numerous additions and improvements to the works, among which might be mentioned the inclined retort system, of which he was one of the pioneers. He comes of a family of gas engineers, who have been connected with the gas industry nearly from its commencement; his father at one time occupying the position of Secretary to the Company. He was a member of the Institution of Gas Engineers.

His loss will be deeply felt, as he was not only respected, but loved as a friend by many with whom he came in contact. He had a very engaging way in dealing with others and a winning personality and grace of manner. His tact was proverbial; and there is no better way of judging a man than by the testimony of those who have served under him. Mr. Bugby was of a very retiring nature, and did many a kindly act which was entirely unknown and unseen by the outside world. He was borne to rest on the 2nd inst., in the Southall Cemetery, by a few of his faithful foremen from the Southall works.

PERSONAL.

IMPENDING RETIREMENT OF MR. SAMUEL GLOVER.

Mr. Samuel Glover, M.Inst.C.E., Engineer and General Manager of the St. Helens Corporation Gas-Works, has intimated to the Committee his desire to be relieved, as from May 1 next, of the duties attaching to these offices; and universal will be the sincere wish that he may thereafter enjoy to the full the many years of leisure to which his life's work, both for St. Helens and for the gas industry, so richly entitles him. It is easy to understand the regret with which Alderman Crooks (as Chairman of the Gas and Lighting Committee) announced to the Town Council the impending severance of a bond which has held for half-a-century, and the subsequent declaration of his intention at a later date to propose a resolution of appreciation of the valuable services which Mr. Glover has rendered to the Corporation.

Mr. Glover will leave his post with fifty years' continuous service to his credit—five years with the late Gas Company, and the remainder with the St. Helens Corporation as their successors, for most of the time as Engineer and General Manager. He could have retired on a superannuation allowance in 1917; but it will be remembered that the Gas Committee asked him to stay on, and he arranged to do so during the war. Then when the war came to an end, the Committee showed their appreciation of him by again expressing the wish that he should stay on, with a substantial addition to his salary.

The new Manager of the Ordnance Wharf Tar-Works of the South Metropolitan Gas Company is Mr. HUGH W. JAMES, who has for many years been assistant there. Mr. S. S. FIELD (whose retirement from the position has already been noticed in the "JOURNAL") has been presented by the officers with a silver rose-bowl and pair of candlesticks. The presentation was made by Dr. Charles Carpenter, who referred to the interest which Mr. Field had always taken in his work, and to the loyal and faithful services that he had rendered, as well as to his strong sense of justice and reputation for fair dealing towards all with whom he came in contact. It was, he said, very gratifying to the Directors that no fatal accident had occurred at Ordnance Wharf during the eighteen years Mr. Field had been in charge there for the Company.

The Darlington Town Council have agreed to a recommendation that Mr. T. T. TARN, at present Works Chemist, should be appointed Chief Assistant to the Engineer and Manager at a salary of £400. It was also decided to advertise the position of Second Assistant, at a commencing salary of £300.

Upon leaving to take up his new position of Chief Engineer to the Newcastle and Gateshead Gas Company, Mr. F. P. TARRATT was presented with a kit-bag on behalf of the staff and workmen of the Darlington Corporation Gas-Works. Mr. Tarratt, who also received a suede leather purse and note-case, referred to his pleasant associations with the gas-workers during the 22 years he had been in Darlington. He entered upon his new duties last Wednesday.

Hearty congratulations to Mr. and Mrs. WILLIAM H. HAMMOND, who have just celebrated their silver wedding. Mr. Hammond is Works Manager and Resident Engineer of the Eastbourne Gas Company. Last Friday Mr. and Mrs. Hammond were presented with a silver tray from the Directors and secretarial staff, and also a silver tankard from "a few nameless old cronies," as Mr. J. S. Gerrard (the Secretary) expressed it, in making the presentation. Earlier in the afternoon, Mr. Hammond received a silver entrée dish and butter dish from the works staff and employees.

The Directors of the Wirksworth Gas Company have appointed Mr. RICHARD ASHWORTH their Gas Manager, in succession to Mr. S. Halstead, who has retired after 21 years' service. Mr. Ashworth began his career at the Buxton Gas-Works.

Mr. H. GALLEWAY, Assistant Manager of the Whitby Gas-Works, has been presented by the employees with a case of pipes, on leaving the service of the Company to take up a position with a firm of gas-plant manufacturers.

Sir JOHN F. C. SNELL, Member of Council of the Institution of Civil Engineers, and Past-President of the Institution of Electrical Engineers, has been appointed by an Order of Council to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

ELECTRICITY SUPPLY MEMORANDA.

THE Ministry of Transport appear to be blessed with a remarkably good publicity department, which knows how to advertise, and how to appeal to the public imagination. We recently had pictured in "The Times" the wonders that were to result from the work of the Electricity Commissioners, when every cottager in the remotest of pastoral places was going to obtain light and heat, clean his boots and knives and forks, and light his pipe by electricity; and at a price never known before. Now there is a more serious business, which has to be considered with respect, because attached to it is the name of such an engineer as Sir Alexander Gibb, with collaborators in Mr. J. Ferguson and Mr. T. G. Menzies. It is a scheme for electricity generation from the tidal waters of the Severn; and it has been painted in glowing colours, to suit the popular taste. It is a project for constructing a big dam or barrage across the Severn, and enfolding in its ample dimensions chambers for the accommodation of turbines and electricity generating plant. The top of the dam would improve railway communication between the West of England and South Wales, and also provide a level road for vehicular traffic. A dam would also be constructed across a "beautiful and romantic valley," so as to form a salt water lake at a high elevation, to boost the tidal deficiencies of the Severn; and to this lake water would be pumped through a 40-ft. diameter tunnel driven through the rock. For this purpose an immense pumping and turbine power house would be provided. If for any reason the turbines on the Severn were rendered inactive (tides are vagarious things, and turbines and generating plant are not immune from troubles), then this power plant would be turned from its pumping functions to help to compensate for the idleness of the Severn plant in producing electrical energy for distribution. There will also be a locking basin, capable of taking the largest ship, on the line of the navigable channel, and intersecting the barrage.

Electrical Power from the Severn.

It is a big scheme of speculation that has been formulated—involving a cost, it is easy to see, of many million pounds. It is anticipated that it would provide half-a-million electrical horse power during a ten-hour day, and have a peak-load capacity of a million horse power. The estimate is that the cost for generation at present-day prices would be a little over ½d. per unit. There is nothing wonderful about this. There are the distribution costs, and much other expenditure involved. Generating cost is not the profitable cost delivered. It is reckoned that this enormous power would save 3 to 4 million tons of coal per annum. This does not move us to admiration. The details as to capital and other costs are all missing from the press communications from the Ministry of Transport. But the foregoing suggests that the cost of the energy delivered to manufacturers' premises would not compete with a home generating plant. These are days of dear capital, materials, and labour; and it is estimated that if the scheme could be carried out, it would provide work for 10,000 men for about seven years! The scheme must fail or succeed on the price at which current can be profitably delivered. It is only, and that vaguely, on paper as yet. But according to the Ministry of Transport the attractions to the consumer are limitless. "They open up a vista which is little short of a revolution for the industrial life of the West and the Midlands of England;" and "bring within the reach of all classes of the community the blessings of light, purity, and power." Mark the use of the word "purity," where "heat" generally stands. The word is advisedly employed. The lessons supplied by Sir Dugald Clerk and Professors Smithells and Cobb have not been lost. Some representative daily papers have swallowed the scheme as something that has almost materialized structurally and economically, and is positively going to revolutionize our industrial and domestic life. We have had this sort of thing before; it is now stale and uninspiring. Experts

A Blessing or a Dam to Progress.

will reserve their opinion of the general scheme until more details are vouchsafed. There is already a merry twinkle in the eyes of some electrical men. Anyway, the electricity industry will not in these times want anything in the nature of a dam to progress or a white elephant of massive proportions forced upon it by the Government—not even in the interests of improved railway communication between the West of England and South Wales. The Ministry of Transport appear to be bent on making the electricity industry the scene of much experimental adventure of a very expensive order. We suppose the scheme will be brought before the Electricity Commissioners when they consider the formation of Joint Authorities for the South-West and Midlands electrical divisions of the country. They cannot proceed unmindful of something which has even provisionally the approval of the Department under whose control they come. But the scheme will require parliamentary sanction; and before this is given, it would, Sir Eric Geddes thinks, have to be referred to outside experts for detailed examination.

Formulating a London Scheme.

One of the severest problems in connection with electricity supply reorganization will be to get the whole of the interests concerned into harmony in the great district which the Electricity Commissioners have mapped out to comprise Greater London. It contains an area of some 1660 square miles; and nine years ago it had a population of nearly 8 millions. The Special Committee of the London County Council who have had the matter in hand have reported on the present position. They regard it as a great thing that they have been able to secure co-operation between the local authorities and the principal London companies in the preparation of a joint technical scheme; and they believe that this will be a material factor in arriving at a satisfactory and agreed solution of many of the problems involved. But the preparation of a technical scheme appears the least difficult part of the problem, with Mr. J. H. Rider acting for the Council, and working in conjunction with the engineers representing the local authorities in Greater London, and nine of the London Electricity Supply Companies. This body of engineering experts are now engaged on the technical details. The rocks ahead are concerned with the administrative and financial part of the scheme; and, in this connection, the Committee have to acknowledge that co-operation and joint action by the different interests affected are not so readily secured. It seems that the local authorities are preparing one scheme for dealing with administration and finance, the companies another; and the Committee are of opinion that the County Council should frame one on their own account—making an effort to co-ordinate the three as much as possible on parallel lines. The Electricity Commissioners have asked that any representations with regard to the area they have mapped-out, together with a scheme or schemes, must be submitted not later than March 31; so that, for a vast matter of this kind, there is not much time to lose to have a finished plan for placing before the Commissioners. The Commissioners have been informed that, if an agreed scheme cannot be prepared, the Council will themselves put a complete project before them by that date.

An Outline of the Proposals.

The report of the Committee as to progress is a long one. A description of the difficulties of the situation constitutes only part of it. No details of the scheme are given. But the lines it will take are foreshadowed; and some of them are interesting. One of the heads is stated to be the improvement and organization of the supply of electricity. That, of course, is not intelligence. And in the same category of what is obvious is that the scheme will deal with the constitution of the Joint Authority, which is not to exceed thirty representatives of the various interests concerned. The relation of the representation of the different interests is one of the knotty problems. When the report was before the County Council yesterday week, the Chairman of the Committee (Mr. G. H. Hume) agreed to the Committee being so constituted as to give representation to the interests of workers engaged in the industry. Then it is seen that all new stations are to be provided by the Joint Authority; also that, with the view to consolidating generation and transmission, provision is to be made for acquisition by the Joint Authority at a suitable time on terms based upon the outstanding life of the plant. This indicates that in time it is intended that all electricity generation for London shall be in the hands of the Joint Authority. A decision that can be applauded is that the financial arrangements are to be such as to provide that the undertaking of the Joint Authority shall be conducted on a self-supporting basis. It is also proposed that the charges shall be regulated to ensure that the benefits and economies resulting from the concentration of generation shall accrue to the consumers. A politic thing, too, is that any deficiency in the revenue of the Joint Authority is to be made good out of future revenue, and, if necessary, by the revision of charges. We wish that this applied to all existing electricity undertakings, and was insisted upon in respect of the distributing concerns that will in time, if the scheme goes through, be the remnants of the existing undertakings operating in Greater London. It is also remarked that the Committee are proposing to include in the scheme provision to enable the Joint Authority to work bye-product plant, and convert residual products; but it is to be a condition that any such subsidiary undertaking shall be worked on a self-supporting basis. We see that the Committee are hoping the Government will not abandon the financial clauses which appear in the supplementary Electricity Bill which was pigeon-holed this session. But other people hope they will. There is no reason why the Government should finance the electricity supply industry any more than the gas industry or other public utility concerns. The gas industry could do with some new money in the shape of Government provided loans at 5, 5½, and even 6 p.ct.

Small Candle-Power Units.

There is greater appreciation now that there are many situations in which very small units of light are quite suitable, and should be used for the sake of economy, especially in these times when costs are not what they once were. Neon gas from the atmosphere is regarded to-day as being very valuable in connection with the manufacture of gas-filled lamps. The gas, it is stated, glows with a fine orange-coloured light, and has a lower resistance than the inert gases at first employed. The Engineering Correspondent of the "Daily Telegraph" states that neon lamps (the neon being combined with 25 p.ct. of helium) are now being made in units which consume only 5 watts, and can be used on a 220-volt circuit. Of course the light is small; but the lamps can be employed where an ordinary metallic filament lamp would be wasteful, since the latter has not been made to consume less than 20 watts on a 220-volt circuit. The external appearance of the lamps is said to be similar to an ordinary glow lamp; but the filament is replaced by four aluminium plates, 6 in. long by $\frac{5}{8}$-in. wide. With other lamps the limiting factor of life is the disintegration of the filament; but 8000 to 10,000 hours' continuous running is stated to be readily obtained with the neon-filled lamp. We have learnt to be a little sceptical of early reports regarding new electric lamps, as experience has always discounted them more or less. In this case it is admitted that deterioration of the luminous efficiency will occur if the pressure of the confined gas varies. Among other information, it is mentioned that lamps have been produced which give 350 c.p. on a 220-volt continuous current supply with an efficiency of 1·8-candle per watt. These, however, require the use of a special starting device.

An Indefinite Lamp Patent.

Writing of gas-filled lamps reminds us of the result of the appeal of the British Thomson-Houston Company in the case in which they were concerned with the Corona Lamp Works, Ltd., which raised the question as to the validity of their patents in respect of gas-filled lamps. The decision went against the appellants. Mr. Justice Sargant, in the Court below, held that the earlier patents did not make disclosure that deprived the plaintiffs' patent of subject-matter or inventive merit. The Master of the Rolls agreed. One of the claims was for an incandescent electric lamp having a filament of tungsten or of other refractory metal of "large" diameter or cross-section or of concentrated form. The word "large" brought disaster to the plaintiffs in the action. The Master of the Rolls declared that Mr. Justice Sargant was right in holding that the patent was bad from insufficiency, because there was inadequate definition of the word "large" to show the ambit of the monopoly claimed. That is all; and so the appeal failed. The appellants lost through indefiniteness in the drafting of their specification; and their loss will be a warning to others.

Permits for Strangers.

The Manchester Corporation's big electric power station in Stuart Street has had an unenviable amount of notoriety through the fortunate discovery of the Sinn Fein plot to destroy it. We may congratulate the Committee and the Chief Electrical Engineer (Mr. S. L. Pearce) on the fact that the carefully prepared scheme for destroying the station and injuring the industries of the city dependent on electric power went astray. But the Manchester electricity station is not the only public utility concern that was marked out by ferocity and imbecility for their attentions. The moral of the Manchester revelations is that greater care must be exercised in the issue of permits to inspect works and stations; and something must be known of those for whom the permits are issued before ever strangers are allowed to roam through such places.

The proceedings at the Sheffield conference of the British Commercial Gas Association have been issued in pamphlet form—the Industrial Economy Section [price 2s.], the Domestic Economy Section [price 1s. 3d.], and the National Economy Section [price 10d.]. The Presidential Address of Sir Robert Hadfield, and other portions of the conference, are included in the November issue of the "Bulletin."

At a meeting of the London and Southern District Junior Gas Association, to be held at the offices in Horseferry Road of the Gas Light and Coke Company, at 7.30, on Friday, Dec. 17, Mr. Stephen Lacey, Assoc.M.Inst.C.E., B.Sc. (Eng.), the Company's Distributing Engineer, will deliver a lecture, illustrated by lantern slides, entitled "Some Distribution Problems in the Light of Present-Day Developments in the Gas Industry."

REPORT OF THE CHIEF INSPECTOR OF MINES.

Statistics for 1919.

THERE has been issued by the Home Office, over the signature of Mr. W. Walker (Chief Inspector of Mines), Part III. of the Annual Report upon Mines and Quarries, giving statistics for the year 1919.

These show that the total output of coal was 229,779,517 tons, and the value at the mines and quarries £314,113,160. When compared with 1918, these figures show an increase in output of 2,030,863 tons, and in value of £75,872,400; the actual totals for the year having been 227,748,654 tons, with a value of £238,240,760. The output in the year 1917 was 248,499,240 tons, and the value £207,786,894; while in 1916 there was an output of 256,375,366 tons, of a value of £200,014,626. The average price of coal at the pit was 27s. 4·08d. per ton in 1919, as compared with 20s. 11·06d. in 1918. The price of coal per ton at the mines in the four preceding years was: 1917, 16s. 8·68d.; 1916, 15s. 7·24d.; 1915, 12s. 5·6d.; 1914, 9s. 11·79d.

There are included in the report tables which show the distribution over the different fields of the total increase in output of 2,030,863 tons last year as compared with 1918. In the English fields there was an increase of 1,090,054 tons, in Wales of 372,750 tons, in the Scotch fields of 567,646 tons, and in Ireland of 413 tons. The respective outputs were: England, 160,509,879 tons, value at the mines, £210,292,314; Wales, 36,719,360 tons, value £61,517,043; Scotland, 32,457,864 tons, value £42,176,746; and Ireland, 92,414 tons, value £127,057. Of anthracite (which is included in the statistics relating to coal) the output for the year dealt with in the report was 4,236,256 tons, having a value of £6,426,283. In 1918, the output of anthracite amounted to 3,811,935 tons, of a value of £4,629,402.

In the table already quoted from, there is included the approximate price per ton of coal at the mines for each county in which it was raised. In the case of England, the price varied from 37s. 6·91d. in Northumberland to 17s. 11·32d. in the North Riding of Yorkshire; the average figure being 26s. 2·44d. For Wales the figures range between 44s. 4·10d. and 33s. 1·17d. in Brecon and 23s. 11·18d. in Denbigh; the average being 33s. 6·08d. In the case of Scotland, the highest price was 31s. 6·58. for Dumbarton, and the lowest 21s. 10·78d. for Renfrew, with an average figure of 25s. 11·86d. For Ireland the highest was 29s. 11·42d. in Queen's County, and the lowest 20s. for Kilkenny; the average being 27s. 5·97d.

The quantity of coal exported during the year, exclusive of coke and manufactured fuel, and of coal shipped for the use of steamers engaged in foreign trade, was 35,249,568 tons, which compares with 31,752,904 tons in the preceding year, and 34,995,787 tons in 1917. There was also in 1918, in addition to the quantity already named, the equivalent of 2,515,017 tons of coal exported in the form of 1,509,010 tons of coke, and 1,537,213 tons in the shape of 1,708,015 tons of manufactured fuel; while 12,021,242 tons of coal were shipped for the use of steamers engaged in foreign trade. Therefore, the total quantity of coal which left the country in one way or another was 51,323,040 tons, compared with 43,390,496 tons in 1918, and 48,728,461 tons in 1917. Taking the coal exported as such, it is seen that France received nearly 16,250,000 tons, and Italy over 4,500,000 tons.

The amount remaining for home consumption for all purposes out of the total quantity of 229,779,517 tons produced during 1919 was 178,456,477 tons, or 3·866 tons per head of the total population for the year 1919. The comparative figures for 1918 were 184,358,158 tons and 4·385 tons per head of the population. In 1917 the quantity of coal which remained for home consumption (199,770,779 tons) was 4·725 tons per head. Turning again to the year 1919, of the total quantity of coal 37,076,310 tons were used in the manufacture of coke and briquettes, as compared with 39,954,974 tons in 1918; and 2,309,587 tons of coal and 9,384,337 tons of coke (together the equivalent of 17,950,149 tons of coal) were used in the blast-furnaces for the manufacture of pig iron, against the equivalent of 21,417,973 tons of coal in the preceding year.

The total quantity of coal raised in the 47 years from 1873 to 1919 is 9,421,852,000 tons; and of this amount 2,271,191,000 tons, or more than 24·1 p.ct. of the total production, have been shipped abroad as exports in the form of coal, coke, and manufactured fuel, and as coal used for steamers engaged in foreign trade.

THE OUTPUT OF COKE.

As to coke, returns of production were received from 129 colliery owners (comprising 167 separate works), 1368 gas companies, and 24 other owners of coke-ovens (comprising 29 works). The counties of Durham and York furnished in 1919 more than 64 p.ct. of the total quantity of coke made at coking-ovens; and 63 p.ct. of the total number of ovens were being worked in these counties. Of the 196 works (other than gas-works) where coking plant is in use, bye-products were recovered last year at 117. A year ago the number recovering bye-products was 116.

In the year under review the total quantity of coal used in the manufacture of coke is stated to have been 35,190,754 tons; the amount of coke obtained being 19,426,657 tons—7,883,340 tons at gas-works, and 11,543,317 tons at coke-ovens—of a total value of £40,354,596. There was an output in 1918 of 38,219,479 tons of coke—7,945,055 at gas-works and 13,121,311 tons at coke-ovens—of a total money value of £35,413,547. Of last year's output from gas-works, 6,845,341 tons came from England, 155,985 tons from Wales, 690,816 tons from Scotland, 182,197 tons from Ireland, and 9001 tons from the Isle of Man. There were 15,133 coking-ovens in use, as compared with 16,292 in 1918; and of these 5695 were of the beehive type, against 6615 the previous year, and 7013 in 1917. There were last year in use 2202 Otto Hilgenstock ovens, 1847 Simon-Carves ovens, 1404 Semet-Solvay ovens, 1364 Koppers ovens, and 1237 Coppée ovens. With regard to briquettes, there were 2,060,743 tons produced last year; the selling price at the place of manufacture representing £4,815,142.

IRON ORE AND OIL-SHALE.

With regard to iron ore, there was a total output last year from mines in the United Kingdom of 6,263,162 tons, valued at £6,226,295, and from quarries of 5,991,033 tons, valued at £1,202,071. In addition to this, there were 5,200,696 tons of iron ore, valued at £11,271,244, imported into the United Kingdom. The total quantity of iron ore actually available for the furnaces was 17,710,870 tons. The quantity of pig iron made from this was 7,417,401 tons, the value of which would be according to the average export value for the year, £100,333,163. Of this, 3,808,095 tons, valued at £51,511,064, was pig iron made from British ore.

In 1919, there was an output of oil-shale of 2,763,875 tons, the average price of which per ton at the mines was 11s. 4·07d.; the total value being £1,567,050. The figures for 1918 were 3,080,867 tons of oil-shale of a value of £1,528,584. The average yield of oil from mines in Scotland is given as 20 gallons per ton of shale, and of sulphate of ammonia 40 lbs. In the year under review, 721,416,844 gallons of petroleum, valued at £36,296,455, were imported into the United Kingdom. The figures for 1918 were 1,324,495,125 gallons, of a value of £63,933,294.

STEAM-RAISING WITH COKE BREEZE.

REFERENCE was made in last week's "JOURNAL" to the "Turbine" patent forced-draught furnace for boilers, as being an arrangement in connection with steam-raising which is gaining increased popularity in gas-works. In speaking of the invention in relation to gas-works, it is not, of course, intended to suggest that the furnaces are not equally applicable to other places. The point it is wished to make here, is that they will successfully burn material for which it is not by any means always easy to find good use on a gas-works—that is to say, coke breeze passing a ½-in. screen. Inquiries which have been made go to show that much of the business being done by the Turbine Furnace Company, Ltd., of No. 5, Budge Row, London, E.C., with gas undertakings is of that character, which affords the best testimony in their favour. By this is meant repeat orders. Indeed, in more than a single instance an order for one furnace has been followed by others for a series. It will be gathered from this that there has been ample time thoroughly to test the capabilities of the invention in actual practice, and that promise has been fulfilled by performance, in the satisfaction it has given in working.

The outlay involved in the installation of a "Turbine" furnace is not great; whereas the saving to be made on a gas-works by the consumption of such low-grade fuel as has been named, of course, is. It can be easily fitted, in a very short space of time, to any type of boiler; and once fixed, it can be as easily taken out again for inspection purposes. As is suggested by the name given to it, the furnace is designed on the principle of the impulse turbine. The air for combustion is forced through a trough of diminishing section which is comparable with the nozzle of the turbine, and between fire-bars which are formed much like the blades of a turbine. The bars are designed so as to offer a minimum of resistance; and the complete arrangement is such that each fire-bar receives an equal amount of air, which is distributed through the narrow air-spaces in the form of fine sprays, resulting in an equal rate of combustion over the whole grate area. The design of the dead-plate is such as to afford additional room for combustion in the furnace proper. The combustion chamber is provided by building a second fire-bridge about 18 in. behind the usual bridge, in such a manner that the flames are more evenly distributed round the furnace-tube—air being admitted to this chamber as required through a door fixed under the first bridge. The furnace is readily adjusted for the combustion of different kinds of fuel.

The successful adaptation of the "Turbine" furnace to the Cochran type of vertical boiler is an interesting development of the invention; and to readers of the "JOURNAL" it will be of additional interest to learn that this adaptation was largely due to the suggestion of Mr. J. Ferguson Bell, of Derby, who was already burning coke-dust with good results in "Turbine" furnaces fitted to Lancashire boilers, and was desirous of extending the system to a Cochran boiler which was at the time working on large coke. In this case, the ordinary grate is removed; but no structural alterations are necessary. The grate-area is reduced, and all combustion takes place in the centre square.

The first quarterly meeting of the session of the Scottish Junior Gas Association (Eastern District) will be held at the Dundee Gas-Works next Saturday afternoon, when Mr. Henry Rule, of Kelty, will give an address on "A Few Months' Working of a Tully Water-Gas Plant."

SECOND ANNUAL CONVENTION OF THE AMERICAN GAS ASSOCIATION.

[FROM AN AMERICAN CORRESPONDENT.]

ONE measure of the success of the Second Annual Convention of the American Gas Association is the record-breaking attendance of 1300. Another is the spirit of determination and optimism characteristic of the entire meeting. The general sessions of the Association, and the separate gatherings of the five sections, were held on Nov. 15 to 19, in the Hotel Pennsylvania, New York City. There was also the usual display of gas apparatus and appliances, with over a hundred exhibitors. Limitation of space precludes a complete narrative of the proceedings; and only the most important features can be mentioned here. [Notes, however, of some of the papers presented have already been given, and others will be published as opportunity offers.—ED. G. J.]

At the opening session, President George B. Cortelyou referred to the great progress made in Association affairs. The membership now includes 768 gas companies and manufacturers, and 2140 individuals. The annual receipts exceed $150,000. He said that the increase in the cost of new materials called for investigation as to modifications in present manufacturing practice, and that the industry must draw more from the resources of chemistry. There must be relief from burdensome regulations. He called for concerted progress, and declared that the industry faced the future confident that they would be contributors to the country's welfare.

Mr. R. L. Welch, Counsel of the American Petroleum Institute, looking forward to the gasoline demands of 10,000,000 automobiles and trucks in this country in 1921, stated that the day of gas oil as a bye-product had gone, and in future the gas company must bid against the automobile user.

At the second general session, Mr. P. H. Gadsden, as Chairman of the Emergency Committee, presented a report on the steps taken since last May to improve the condition as to oil supply and prices, and to inform the public of the alarming situation of the gas industry, brought about by the scarcity and high price of oil and coal, in conjunction with the tardy action of Regulatory Commissions in allowing increases in prices charged for gas. He stated that the present attitude of the oil and coal suppliers might force the gas interests to ask for national regulation of these materials.

The sectional meetings were held each afternoon, with audiences ranging from 100 to 300, according to the section or the particular matter being discussed; for members whose daily work covered a wide range of subjects found it advantageous to pass from one section meeting to another during the same afternoon, in order to hear the particular matters of most interest to them. In the Accounting Section, perhaps the report of most vital significance was from the Committee on Standard Classification of Accounts for Gas Corporations, telling of gratifying progress in the very difficult task of unifying the requirements of the many State Public Utility Commissions. The Commercial Section discussed the uses of gas in seventeen processes or industries, and considered many ways and means for increasing gas sales. The Manufacturers' Section considered trade prospects, and the question of future exhibitions at Association meetings.

The Technical Section found it necessary, in view of the many subjects demanding attention, to increase the total meeting time to twelve hours, by holding parallel sessions on manufacturing and distribution topics respectively in one afternoon. In the distribution session, the most important feature was the adoption of the report of the Consumers' Meters Committee. This provides a standard practice for the testing and repairing of meters brought in from use, and is a valuable addition to gas literature. In discussing this report, a recommendation was made that consideration be given to changing meter-size nomenclature to an hourly gas-flow basis. The Electrolysis Committee reported on their year's work. There was a good discussion upon the advisability of modifying present standards for the connection of new to existing mains.

Among other technical papers, "Demand Limiting Meter" was listened to with great interest. This device, designed to limit gas supply without danger of extinguishing, will, if successful, meet a crying demand for conservation of natural gas; and, if the three-part rate for gas wins general acceptance, it might find a place in manufactured gas supply. The tone of the discussion was that present experience with the device had been too brief for any proper judgment of its merits. The report of the Purification Committee was another contribution that raised a lively and interesting discussion.

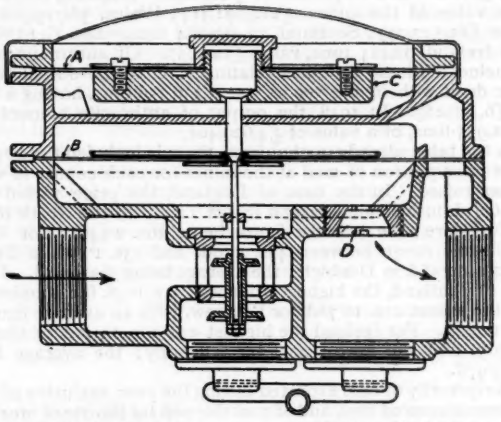
The entertainment features consisted of the President's reception and dance, the President's dinner to the Association officers (on which occasion a handsome desk-set was presented to the President, as a slight appreciation of what he has done for the Association in the two-years-and-a-half of formative period during which he has held the helm), and the banquet attended by 800.

The meeting furnished absolute proof that in the Association the gas industry possesses a fit instrument by which to shape its future under the best possible conditions. The new President is Mr. Charles A. Munroe, of Chicago.

THE DEMAND-LIMITING METER.

IN a paper which he submitted at the annual convention of the American Gas Association, Mr. H. D. HANCOCK, of the Empire Gas and Fuel Company, Bartlesville (Okla.), gave the following description of the "Empire" demand-limiting device, in connection with the demand system of selling natural gas.

The demand-limiting meter is a mechanical device which controls the maximum rate of demand which may be made by each individual customer, and automatically limits the flow of gas through the customer's meter to the amount which is contracted for with the distributing company. For all rates of demand up to and including the rating of the demand-limiting meter, no effect is exerted upon the gas service to the customer, except that, where the combination pressure-regulator and demand-limiting meter is employed, the pressure is reduced and maintained at the outlet of the demand-limiting meter at a constant predetermined value. In the event, however, of the customer opening more burner-valves than can be fully supplied with the rate of flow fixed by the demand-limiting meter, the pressure on the house-piping is reduced, and the flow of gas is divided among the appliances in operation, none of which will receive a normal supply, but which, in the aggregate, will still receive gas at a rate of flow equal to the rating of the demand-limiting meter in service.



A—Regulator diaphragm. C—Regulator diaphragm weight.
B—Auxiliary or limiting diaphragm. D—Orifice.

The "Empire" Demand-Limiting Device.

The demand-limiting meter is similar in general design to a low pressure service regulator, to which are added several features necessary to secure the desired limiting action on the supply of gas to the customer. Such additions to the usual form of regulator consist of, first, an auxiliary diaphragm placed below the usual regulator diaphragm; secondly, the joining of the regulator-valve stem to the upper diaphragm with a link-connection passing through the lower diaphragm in a special slip-joint; thirdly, placing a combination valve and stop upon the stem of the lower link which engages with the lower diaphragm at a certain point in the travels of the regulator valve and the lower diaphragm; fourthly, an orifice placed after the regulator-valve, through which all the gas passes; and, fifthly, a connection from the outlet side of the line orifice to the space between the two diaphragms.

The pressure on top of the upper diaphragm is zero gauge or atmospheric. The upper cover-plate being provided with an atmospheric vent, the pressure between the diaphragms is equal to the pressure at the outlet of the line orifice; and the pressure on the bottom of the lower diaphragm is equal to the pressure at the outlet of the regulator valve, which is the same as the pressure at the inlet of the line orifice. The upper diaphragm, therefore, being actuated by the pressure at the outlet of the line orifice, governs the movement of the regulator-valve, and accordingly maintains a constant pressure on the outlet of the device as long as the links in the valve-stem are engaged. The lower diaphragm is actuated only by the differential pressure across the line orifice.

At any rate of flow less than the rating of the demand-limiting meter, the differential pressure across the line orifice is insufficient to overcome the weight of the lower diaphragm, allowing the latter to assume a low position and the links in the valve-stem to engage, thus causing the device to operate as a simple pressure-regulator, and to maintain constant pressure at the outlet of the line orifice. As the flow increases, however, causing an increase in the differential pressure across the line orifice, a point is reached where the lower diaphragm begins to function, and in its upward travel engages the stop on the valve-stem, and carries the valve to a higher or more nearly closed position. When this latter action occurs, the links above in the valve-stem are disengaged, due to the lifting of the lower link, thus rendering inoperative the constant-pressure regulator feature of the device, and causing it to function entirely as an instrument to maintain a constant differential across the line orifice, and hence a constant flow

of gas which is, of course, the rating given to the device. For example, if the line orifice is selected to produce a differential pressure sufficient, at a rate of flow of 30 c.ft. per hour, to lift the lower diaphragm and disengage the links in the valve-stem, the pressure at the outlet of the device will be maintained at a constant value up to and including a flow of 30 c.ft. per hour; but should the customer open more burner-valves than can be fully supplied by a total flow of 30 c.ft. per hour, the pressure in the house-piping will be reduced to an amount which will discharge the entire 30 c.ft. per hour supply through the increased orifice area in the appliance burner-valves. In other words, the pressure in the house-piping is controlled by the amount of discharge orifice area in the burner-valves.

The normal pressure delivered by the demand-limiting meter up to and including its rating is, in its present adjustment, equivalent to 3 in. of water-column. The adjustment of this pressure is made by varying the amount of weight on the upper diaphragm similar to the readjustment of pressure in the usual dead-weight type service-regulator.

For domestic service, the demand-limiting meters are being produced in 1-in. and 1¼-in. sizes, and in straight-way and angle types in each size—thus making them suitable for ready adaptation to all the usual types and sizes of domestic meters in general use. The size of the line orifice is the factor determining the rating of the device; and a given demand-meter installation may therefore be readily adapted to meet the requirements of the appliance installation by the insertion of the proper size of orifice. The line orifice consists of a carefully drilled plug, calibrated with due regard to gas density and temperature and the prevailing barometric pressure.

NEW PORTABLE GAS-STOVES.

Two useful portable gas-stoves, for connection to the supply-pipe by means of flexible tube, are being marketed by Ajax Heaters, Ltd., Derby Avenue, North Finchley, N. Disconnection is a matter of moments only; so that one stove may be used for several rooms, the heating of which may be desired at different times. The style of the stoves will be seen from the illustrations.

The "Artistic."

The "Effective."

The "Artistic" is of handsome design, and made throughout of 24-gauge copper, with an oxydized finish, and fitted with a glass panel. The effect when the stove is alight is quite pleasing. The "Effective," of more familiar pattern, is made of sheet steel, and fitted with a pure copper reflector and sides. As to their efficiency, it is stated that either stove will give out sufficient heat to warm a room approximately 16 ft. by 16 ft.; and this being the case, they are well suited to meet the demand for a stove of this character.

Benzol: Its Recovery, Rectification, and Uses.—A copy has been received from Messrs. Benn Bros., Ltd., No. 8, Bouverie Street, E.C., of a book by Mr. S. E. Whitehead, B.Sc. Eng. (Lond.), F.C.S., entitled "Benzol: Its Recovery, Rectification, and Uses," with an introductory note by Lord Moulton. The book will be noticed more fully later.

Thermalene.—A new compound fuel, "Thermalene," suggested by Karl Wolf, of Zurich, is a mixture of acetylene and vaporized oils, and is claimed to have important advantages over other gases as a fuel for high temperatures. As now manufactured, the generating mixture, consisting of alternate layers of calcium carbide and crude oil absorbed in sawdust, is packed in tin cans, the largest yielding 200 c.ft. of gas. The addition of water liberates the acetylene; and the heat of the reaction converts the oil into vapour. The two gases, cooled and purified, combine ready for use in the pipes.

A 120-H.P. Three-Cylinder Vertical Gas-Engine.—The National Gas-Engine Company, of Ashton-under-Lyne, who have hitherto confined themselves, as regards vertical gas-engines, to the construction of the tandem type from 300-H.P. upwards, with two, three, four, or six cranks, are now building a three-crank vertical engine of smaller dimensions, which is described and illustrated in the current issue of the "Engineer." It has one cylinder, 13 in. bore and 14 in. stroke for each crank, and is capable of giving a constant output of 120 B.H.P. on producer gas. The Company have adopted in a large measure the principles of design established in connection with the larger vertical engine; full consideration being given to accessibility to the main parts, and to interchangeability. The engine operates on the four-stroke cycle.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the East Greenwich Gas-Works.

About one hundred members of the Association—an exceedingly gratifying attendance, particularly when the uninviting character of the weather is taken into account—assembled on Saturday afternoon, under the leadership of the President (Mr. Frank J. Pearce, of the North Middlesex Gas Company), for an inspection of the East Greenwich works of the South Metropolitan Gas Company—or, rather, of as much of the 150 acres as could be got over in the short space of a winter afternoon.

On arrival, they were met by Mr. T. Curr (the Engineer of the works), and, having been divided into parties, the tour was promptly begun; those acting as guides, in addition to Mr. Curr himself, being Messrs. R. F. MacDonald, M'Leod, G. Cox, J. H. Thomas, F. A. Frost, G. Anderson, Wilkinson, W. Payne, and Dr. Anderson. An excellent description of the works was distributed among the visitors; so that even what they may have been unable to see—through lack of time only, for nothing whatever was intentionally withheld from them—they had in this way full opportunity of becoming acquainted with.

A start was made with the jetty, where there are four hydraulic cranes with self-acting grabs to raise the coal from vessels lying alongside in the river, and discharge it into storage hoppers. The height from the ship's hold to the top of the hoppers is 75 ft.; and the weight of coal lifted by each grab is about 1½ tons. The coal is removed from the storage hoppers by trains of fourteen wagons, each holding 5 tons, and drawn by steam locomotives. The storage hoppers hold 173 tons; and this capacity allows continuous working of the cranes irrespective of any irregularities in the rate at which the coal is drawn away. It is intended shortly to add four additional cranes, so as to enable two ships to be unloaded simultaneously.

In the Retort-Houses.

From the riverside the visitors were taken to the retort-houses, which are parallel with the river, and at right angles with the elevated railway which runs from the jetty. This affords ready and economical means for supplying each section with coal, and for the transport of the coke and breeze. It is intended that the retort-houses shall be in blocks of four, the first set of which is erected and at work. A commencement has also been made with the second block, the first house of which is built and partly occupied. The capacity of all the houses is 30 million c.ft. a day. The houses are 485 ft. long, and contain forty-five settings in three benches of fifteen each, with ten retorts in a setting. The section in general use is Ω shaped; but the last renewals have been made with retorts of elliptical section, which afford increased facilities in working. All the stoking is done by means of Arrol-Foulis chargers and Hunter-Barnett dischargers, worked by hydraulic pressure. The retorts—20 ft. by 21 in. by 15½ in.—are charged with 11 cwt. of coal; and the carbonizing period is ten hours. With regard to the stoking machinery, it may be mentioned that the time of charging a retort is 40 seconds, and of discharging 20 seconds. The gas produced averages in quantity 12,700 c.ft. per ton of coal. It possesses a calorific value of 560 B.Th.U., and an illuminating power of 15 candles by the No. 2 "Metropolitan" argand. The coke and breeze sold is about 50 p.ct. by weight of the coal carbonized. Most of the settings have a single furnace on each side; but in the later type each double furnace heats three complete settings, with economy of fuel and labour. The clinkering and adjustment of the furnaces is done from a tunnel under the centre of the bench; and along one of these tunnels the members were taken. This arrangement, of course, allows the various operations to be conducted irrespective of the stoking of the retorts. The flow of gas from the foul main is controlled by equilibrium governors of simple type; and the regularity of the exhaust is registered by recording gauges. Condensation is effected by a combination of air and water cooled condenser; the first portion consisting (for each retort-house) of a coil of pipe, 36 in. diameter and 1509 ft. long. The water-cooling is carried out in alternate chambers of gas and water, about 6 ft. high by 10 in. wide, through which gas and water flow in opposite directions.

The Sulphur Extraction Plant.

After the exhausters, the Livesey washers, and the scrubbers, the parties came to the purifying plant, in one particular portion of which very great interest was naturally manifested. This was Dr. Carpenter's sulphur extraction process. There are four oxide purifiers in which the sulphuretted hydrogen is removed from the gas; then comes the plant for the removal of sulphur compounds other than sulphuretted hydrogen; and, finally, two more oxide of iron purifiers are placed at the outlet of the sulphur extraction plant, and serve to remove completely the sulphuretted hydrogen generated therein as a result of the decomposition of sulphur compounds.

The sulphur extraction process consists essentially of passing gas, previously raised to a temperature of 400° C., over reduced metallic nickel, maintained at a temperature of 450° C. The nickel acts as a catalyst in promoting the decomposition of carbon bisulphide, which, in the presence of the hydrogen of coal gas, is converted to sulphuretted hydrogen; carbon in small quantity

being simultaneously deposited on the catalytic material. The carbon is removed by a process of combustion *in situ* at intervals of about one month; and a portion of the plant is temporarily put out of action for the purpose. The plant comprises five units, each capable of dealing with 3 million c.ft. per day. Each unit consists of a producer and combustion chamber, on either side of which are large heating chambers, in which are placed the iron tubes containing the catalyst. The gas, freed from sulphuretted hydrogen, is first conducted through two heat interchangers, which are wrought-iron vessels filled with 3-in. tubes. The hot gas leaving the heating chambers flows through these heat-exchangers in the contrary direction—giving-up a large proportion of its heat to the inflowing gas. The gas is further raised in temperature within the heating chamber, and it then flows in parallel currents through the tubes containing the catalyst; next into the heat interchangers in the reverse direction to the incoming gas; and finally to the secondary oxide purification vessels. Of each pair of heat interchangers, one is efficiently jacketed, the walls of the other being bare, thereby allowing some loss of heat, so that the temperature of the gas entering the secondary purifiers is kept within working limits. The walls and bases of the heating chambers are made thick to prevent radiation losses. The whole plant consumes 5½ tons of coke per day, which is brought to the producers from a coke-hopper by means of a telpher conveyor. Adjacent to the laboratory which controls the operations is a small plant used for aërating the catalyst, in which air required for the removal of carbon on the catalytic material is pumped through the system by means of a fan driven by a gas-engine, the volume being indicated by a meter.

Following the secondary oxide purifiers are the rotary washer-scrubbers for the removal of naphthalene. This is effected by a constituent of coal tar which is specially prepared at the Company's tar works. The station-meter drums work in concrete tanks fixed below the ground-level, and are provided with light wrought-iron roofs. Some time was spent in the first-rate carpentering, machine-tool, and blacksmiths' shops; and complimentary remarks were passed upon a large new building erected with concrete blocks made by the Company on the works.

On the way to the excellently equipped men's Institute (in which the visitors found tea awaiting them), there were passed the big Livesey holders of 8 million and 12 million c.ft. capacity, the former having four, and the latter six lifts, two of which rise above the framing. Attention was also drawn to the centrifugal fans which are provided, not only to increase the pressure of gas at the inlet of the distributing governors, but to increase the rate of flow through the two 48-in. trunk mains by which gas made at the East Greenwich station is conducted to other stations of the Company.

Points Noted during the Inspection.

The President (after tea) remarked that, by the kindness of the Chairman and Directors of the South Metropolitan Gas Company, they had spent a most profitable and enjoyable afternoon. One and all in going round must have been impressed by the efficiency and general good working shown in every department. At these works there were to be seen many things not usually met with on a gas-works. The sulphur extraction plant, which was Dr. Carpenter's own process, was one of these. The very best thanks of the Association were due to the Chairman and Directors of the Company for their kindness in allowing the visit and for the hospitality which had been extended by them; and with their names must be coupled those of Mr. G. M. Gill (the Chief Engineer of the Company), who had come to preside at the tea-table, Mr. T. Curr, and the assistants who had conducted the parties round the works.

Mr. D. C. Cross (Lea Bridge), in proposing that such a vote of thanks be accorded, said the guides had really performed what must have seemed to them rather a thankless task, in showing the members round such a huge place in so short a time. They had, however, done their very best to show the visitors all they could, and to give them a thoroughly enjoyable afternoon. They had been favoured in finding all the shops open and at work for their benefit. One thing noted by him in the course of the inspection, which he had never seen before, was a gas-engine in the fan-room working backwards; some difficulties which had presented themselves being overcome in this manner. Another very interesting point in one of the retort-houses was a coal-elevator working without any guides; and he understood that with this elevator they had less trouble than with any of the others. Then there was an experiment they were trying of putting-up an elevator in reinforced concrete. There were, in fact, many features in connection with these works which were full of interest. The Company had always had a great name for efficiency; and it had struck him in going round the works that the chemical apparatus and the gauges connected with the different plants—a detail often overlooked in works—were very efficient. Of course, looking after details was one of the main points of efficiency.

Mr. W. Grogono (Gas Light and Coke Company), in seconding, remarked, in connection with efficiency, upon the extraordinarily straight line he had seen upon the caligraph. He did not think there was a variation of more than one B.Th.U. anywhere. To obtain this result with only coal-gas plant meant exceptional efficiency in the retort-house. He had noticed that the retorts were charged very full. German retorts in use, he learned, had done 2300 days, which was an extraordinary lifetime for a retort; and the ones he saw were certainly in very good shape.

Make More of Existing Plant.

Mr. Gill (after the vote had been carried by acclamation) said that, on behalf of Dr. Carpenter and the other Directors of the Company, he could assure the members that they had been very welcome there that afternoon. He thanked them, for the Directors and for the guides, for the hearty vote just passed. The Company, and all connected with it, were only too glad for members of the Association to come and look at any of the works; and at any time they might wish to visit another of the stations, they had only to say so. No doubt, most of them had experienced much the same thing that the South Metropolitan Company had—that when account was taken of the enormous cost of new plant now, they came to the conclusion that they could not afford to expend the amount involved, if it could possibly be avoided. Therefore the Company, at East Greenwich and at all their works, were trying to get more out of the plant they already had. It seemed to him this was a lesson they all needed to learn—to make their existing plant do more. His Company had had most encouraging results in this direction. They were making each retort do a lot more work than was formerly the case. By carefully analyzing all the difficulties, going into detail, finding out where faults lay, and putting them right, they reaped the reward of getting more gas out of each unit of plant. Then there was the question of the apparatus outside the retort-house. If they investigated the question of the flow of gas through the plant, by taking the meters every few minutes and showing the result as a curve, it would be seen that the flow was up and down all the time; and there was no doubt in his mind that plant could be made to do ever so much more work, if only the coal put into the retorts was equalized, and in this way the gas-flow made equally uniform. It was much better in these days to make the existing apparatus do more, than hanker after new plant.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Manchester Meter-Testing Station.

The members of the above Association paid a visit to the Gas-Meter Testing Station, London Road, Manchester, on Saturday last. The party were received by the Chairman of the City Justices (Mr. H. N. Barrow, J.P.), and the Official Inspector (Mr. S. Dyson).

The President (Mr. J. Bridge), in introducing the Chairman, said the large attendance there that afternoon clearly showed how much the members appreciated the opportunity of paying a visit to the testing-station.

Mr. Barrow, on behalf of himself and his Committee, gave the visitors a hearty welcome, and remarked that he much appreciated their high calling. He himself had been allied to the gas industry all his life, and was well known to practically all gas departments in the North of England. He believed their testing-station was second to none. In fact, only a week or two ago they had expert visitors from all over the country to see their testing arrangements; and at the conclusion of their visit they expressed their opinion in the same words that he had just used. He referred to the circular distributed and the information contained thereon.

The party then proceeded to go over the Station, being conducted by the Chairman and Messrs. Dyson, Gollins, Winterbottom, and Bates.

Short Synopsis of the Working of the Station.

Heating and Ventilating.—Musgrave's system of heating and ventilating is in use in this department. A 15-h.p. electric motor, geared to a fan, is employed for drawing in atmospheric air, which passes through a water spray to clear it of its impurities. The air then passes into a mixing chamber, and is there heated by steam from a Cornish multitubular boiler. The hot air is then driven into ducts and through gratings into the test room.

Ventilation.—A 2-h.p. electric motor, geared to a fan, is used for extracting the foul air from the test-room. Gratings are fixed in the floor and connected to air-ducts through which the foul air is forced into a chamber and carried outside on to the roof of the building.

Heating Water for Filling Wet Meters.—A galvanized water-tank of 500 gallons capacity is connected by a valve to a mixing tank of 1000 gallons capacity. A steam-pipe is connected from the large boiler to the 500-gallon tank for heating the water, and an auxiliary supply of heat can be obtained from a gas-geyser (when the steam-boiler is not in use). The geyser is capable of heating 4 gallons of water per minute to 100° Fahr. The mixing of hot and cold water in this tank is carried out by turning a wheel geared to propeller blades, and the required temperature of the water can readily be obtained. The outlet of this tank is connected to each testing table, where a thermometer is fixed and can be observed by the operator.

Heating Water in Test Holders.—Each test holder is connected to the large steam-boiler by steam-pipes to a back-pressure valve fixed in the base of the tank of the test holders. The procedure is to take the temperature of the air in the room each morning and then get the water in the test holders and mixing tank to the same temperature.

Air used for Testing Gas-Meters.—The air used for filling the

test holders is obtained from a 12-in. blowing fan, driven by a 1-H.P. electric motor, and connected to each test holder by 2-in. wrought-iron pipes. This blowing fan at present gives 3 in. pressure of air, which can be kept constant; while 5 in. pressure can easily be obtained by increasing the size of the driving wheel on the motor. The fan also supplies air at 3 in. pressure to thirty leakage or test meters, used for applying external and internal tests to gas-meters, as specified in the Sales of Gas Act.

A visit to the adjoining Fire Station was also made, and the various electrical instruments for receiving street calls and recording them were fully explained.

TEA AND A VOTE OF THANKS.

Tea was partaken of in a large room adjoining the Board Room.

Mr. BUCKLEY (Manchester) moved a vote of thanks to the Chairman, Mr. Dyson, and his staff, and congratulated them on their station. He had been particularly pleased to note how all sources of error are eliminated in their method of testing. He was also pleased to observe the keen interest shown by the Chairman.

Mr. OLDFIELD (Manchester), a former Secretary, and one who was connected with the Association in 1898 but had been absent from England for about nine years, seconded the vote of thanks.

Mr. BARROW, in a few choice and helpful words, replied.

Training of Gas-Works Chemists.

Mr. F. B. SMALL (Liverpool) then read his paper, the text of which appeared in the "JOURNAL" last week (pp. 524-25).

DISCUSSION.

The PRESIDENT, opening the discussion, said Mr. Small had handled his subject as only a past-master in the art could do. The paper was out of the ordinary line they had at their meetings, and dealt with a subject which was of considerable importance in the efficient and successful working of a gas undertaking. Without doubt, the chemist had not occupied the position in past years in the gas industry which he did to-day—a position that would improve in the future. A few years ago there were many medium-sized and even large undertakings that did not employ a trained chemist. The position was very different to-day; and it was only the smaller works that were without a chemist. Considerable care was exercised in appointing engineers, managers, and assistants. The best obtainable for the salary offered was required; and so it must be with the chemist, because his work was equally important. Mr. Small had indicated to them the preference he had for the training of a works chemist. The point raised by Mr. Small, as to the University graduate not having experience in handling men, was worthy of consideration. In some cases, such a condition depreciated any advantage otherwise gained. He was inclined to think the analytical chemist not wholly free from the same disadvantage; but in either case, as the works chemist, except in the few very large gas undertakings, was amenable to the works engineer and manager, the disadvantage was somewhat discounted, and the question resolved itself into appointing the man with the best training, reliability, and adaptability. The subject was of particular interest to him by reason of its importance and, further, by reason of the fact that he succeeded Mr. Teasdale as the Association's representative on the Education Committee of the Junior Associations. Mr. Teasdale, while he was the representative on the Committee, worked hard in assisting to evolve an educational scheme worthy of the gas profession. This matter was mentioned at the annual meeting; and as further progress had been made since then, he considered it was a fitting opportunity that day to make a few remarks on the subject. The Institutions of Civil Engineers, Mechanical Engineers, and Electrical Engineers had definite courses of study outlined which could be followed by the student who desired to become a member of these Institutions. Unfortunately, such was not the case in the profession. However, it was hoped that this defect would soon be remedied; and an educational scheme was now in a state of embryo. This scheme had arisen from a resolution passed at a Joint Council meeting of the English Junior Gas Associations in 1917, to approach the Institution of Gas Engineers with a view to improving the conditions under which instruction in gas matters was carried on. Entering the gas industry, they found there were examinations in Gas Engineering, Supply, and Fittings to be passed; but these were not arranged in courses with other ancillary subjects to be studied. Sometimes the student was wisely advised by his chief as to the line of study he should pursue in qualifying for a gas engineer; or, on the other hand, he was left to his own devices and took the Gas Engineering, Supply, and Fittings Examinations and any other subject he might choose. The Joint Council of the Junior Associations had been anxious for some time to have conditions changed, and, with a Sub-Committee of the Institution, had approached the Council of the Institution of Gas Engineers with a definite scheme of education which should be followed by the junior gas engineer. The Joint Council and the Education Sub-Committee had given the scheme very careful consideration; and though it had proceeded slowly, the progress had nevertheless been sure and certain. But with an important matter as this was, one was inclined to think that the Committee might have met more frequently and expedited matters. However, practically all the spade-work had now been done, and the matter had been referred to the Institution Council and the Board of Education. In regard to the suggested grades into which the scheme was to be divided, he assured them that the ancillary subjects which were to be studied along with gas engineering, gas supply, and gas-fittings would indicate clearly to the junior gas engineer the subjects he should study so that he might ultimately pass the diploma course and become a member of the Institution of Gas Engineers.

Mr. ALBINSON (Manchester) suggested that youths should be trained and given an opportunity of taking positions in any works, and spoke against the practice of their being only trained in one special branch of the chemical industry.

Mr. HAILSTONE (Rochdale) suggested that the commercial side should also be taken into consideration, and pointed out that there was a point where it was not of commercial value to obtain the very highest efficiency from a particular plant. He emphasized the value of research chemists working on behalf of all undertakings.

Mr. CARTER (Liverpool) remarked that some engineers made a special feature of a particular plant or process to the almost complete exclusion of others. One might take carbonization, another purification, and so on. He suggested that small works and those that had no chemist should combine and engage the services of a good chemist. It was very desirable that more co-operation and consultation should exist between the manager and the chemist as to the daily working of the various plants, and thus add very greatly to the success of the undertaking.

Mr. BARROW said education was everything; and he considered there was a future for the chemist. In regard to the new regulations that were about to be enforced, he remarked how necessary it was for them to be prepared to work under the proposed new Act. He was in favour of all men being efficiently paid; and he himself was prepared to do his utmost to lift the gas profession to a high standard.

Mr. W. H. BATTERSBY (Bury) called attention to the fact that the position of the chemist was not always an enviable one. He was a kind of policeman, and was not always appreciated by the works' foreman and others in charge of the various plants. Again, some engineers did not always realize the help a chemist could be in the working of the undertaking. He suggested a greater degree of confidence between the engineer and the chemist.

Mr. W. L. HEALD (Preston) mentioned the fact that both were essential; but he did not see that the best points in each profession could be combined in one man, as a very highly-trained and scientific man was not often found to be very practical on either engineering or chemical questions.

Captain SINNATT proposed a vote of thanks to the author for his excellent paper, and explained how gas-works chemistry now came in the Manchester School of Technology courses. One could now get the A.I.C., which would be the best qualification that he could obtain for his future work. He thought that the position of the chemist was likely to be much improved, as a great advance was being made. He also spoke of the necessity for co-operation between the engineer and the chemist.

Mr. TEASDALE (Salford), in seconding, called attention to the fact that if a chemist had an idea of some time becoming an engineer and manager, it would be necessary for him as a chemical student to enlarge his course of study so as to embrace the necessary engineering subjects.

Mr. SMALL replied suitably.

Gas Consumption of a China Kiln.

A gas-fired china kiln, designed and installed by the General Combustion Company of Chicago, is described by Mr. Walter V. Turner, in "Gas Record." It is at Trenton (N.J.), and is said to be the largest gas-fired furnace of its kind in the United States. It is of the type known as a continuous compensating furnace or tunnel kiln, and will use from 5000 to 8000 c.ft. of gas per hour. The over-all length is 83 ft. There are twin chambers, through which the china ware is passed on cars. The treating zone is near the centre; and thus a single source of heat supplies both chambers, and the entering cold china is preheated by the treated stock *en route* to the exit. The efficiency of this heat transfer is dependent upon the natural convection currents set up in the inert atmosphere of the furnace by the heat radiated by the charge. The heat transfer is accomplished through openings in the central wall at the top, thus permitting the hot rising air currents to escape into the right chamber. Upon entering the chamber, and there encountering a colder charge, the air currents are cooled and fall rapidly to the bottom of the chamber, where escape is again provided for (through the central wall) to the heated charge. Thus, it is said, a simple heat engine of great power and efficiency is utilized throughout the pre-heating and cooling zones, to gradually preheat the charge, to gradually cool the treated stock, to equalize the heat throughout each carload of charge, to prevent local overheating, and to prevent local cooling at too rapid a rate. The treating zone is heated by the products of combustion from external combustion chambers on opposite sides of the furnace, but without inter-communication. The hot gases pass upwards through flues in the side walls, and across both chambers, and then escape in the direction of the incoming china ware. Gas and air for combustion are supplied under a pressure of 1 lb.; the highest temperature reached in the furnace being approximately 2400° Fahr.

Producer Gas.—A fourth edition has been reached of the well-known book on "Producer Gas," by Messrs. J. Emerson Dowson, M.Inst.C.E., M.Inst.M.E. (retired), and A. T. Larter, M.B.E., B.Sc. (London), Associate of the City and Guilds of London Institute. The subject dealt with is one in which there has, since the publication of the first edition, in the autumn of 1906, been very great development; and therefore the authors have rightly taken the opportunity of thoroughly overhauling what was said originally, so as to bring the matter up to date. This development has, of course, not been confined to the plants themselves, but there has also been great growth in the number of uses to which producer gas is put; and thus there is the greater need for such a book as this. Entirely new chapters are devoted to producer gas from peat, to gas-traction for road vehicles, and to gas-propulsion of vessels, in all of which directions the authors find promise of future development. The various plants and processes are fully described in the book, which is well illustrated. The publishers are Messrs. Longmans, Green, & Co., of No. 39, Paternoster Row, London, E.C.; and the price is 21s. net.

MODERN DEVELOPMENTS IN THE MANUFACTURE AND UTILIZATION OF COAL GAS.

On Saturday, the 27th ult., Mr. FRED. J. WEST and Mr. T. A. TOMLINSON contributed a paper on the above subject to the Manchester Association of Engineers. The paper was illustrated by five diagrams, sixty excellent lantern slides, and the cinematograph to which we referred in the "JOURNAL" for Nov. 17.

Mr. H. PILLING (Messrs. Galloways, Ltd.) referred in his opening remarks to Mr. John West, who is a Trustee of the Association, and its oldest Past-President.

Mr. WEST then proceeded to read an abstract of the paper, interspersed with descriptions of the lantern and cinema pictures as these were projected on the screen. He said that the carbonization of coal, by which is meant the dry distillation, or heating *in vacuo*, of coal to extract its gaseous and liquid constituents, leaving coke or carbon as a residual, is a subject which has not been referred to in any communications read before the Association since the Presidential Addresses of Mr. John West in 1890 and 1891. The problem of the treatment of coal is, however, of such importance at the present date—inasmuch as the prosperity of our great nation and its place in the world is bound-up with the right handling of this, its principal material asset—that not only is no apology needed for bringing this subject forward for notice, but, when approached by the Council to contribute something to the proceedings, it was felt to be an opportunity of fulfilling a duty in urging engineers generally to the careful consideration of this most vital question.

It should be pointed out to begin with that, although there are alternative fuels in considerable quantity—oil is the conspicuous example—the fuel of the world in the immediate future, and perhaps for a very considerable time, will be coal and its derivatives. The world is calling for power, and more and more power, to relieve man of arduous labour. By far the greatest portion of this power must be obtained from coal.

For convenience the authors had divided the paper into three main parts: Part 1 being an account of the constitution of coal gas and the principal bye-products arising from its manufacture; part 2, an account of the apparatus and machinery used in the manufacture of gas; and part 3, an account of the application of gas to domestic and industrial purposes.

CARBONIZATION.

Carbonization is only practiced to any great extent with bituminous coals. Increasing importance attaches to the application of a similar treatment to the large deposits of lignite or brown coals which exist in many parts of the world, often lying very near to the surface, and consequently capable of being cheaply mined or excavated. One of the urgent questions of the day is the proposal to treat steam coals also in such a manner as to obtain the same bye-products before consuming the fixed carbon under boilers. It is a matter for speculation whether it would not be advisable to gasify the whole of this carbon and apply the gas to the firing of boilers. This will be referred to again towards the end of this paper.

COAL GAS.

Coal gas is a mixture of the combustible gases—hydrogen, methane, and carbon monoxide—with small quantities of the more complex hydrocarbons called unsaturated hydrocarbons, and with small quantities of the incombustible or inert gases—carbon dioxide, nitrogen, and traces of oxygen. Since the almost universal application of the incandescent mantle to gas lighting, the illuminating value of gas, as well as its value for general heating, cooking, and power generation purposes, depends entirely on the calorific value.

The following table shows the principal properties of these gases:

Table II.

—	Hydrogen. H_2.	Methane. CH_4.	Carbon Monoxide. CO.	Unsaturated Hydrocarbons. C_nH_m.	Carbon Dioxide. CO_2.	Oxygen. O_2.	Nitrogen. N_2.	Air.
Density, H = 1.	1	8	14	It is usual to take the calorific value of propylene C_3H_6 as the average of these.	22	16	14	14·48
Specific gravity, air = 1	0·0691	0·559	0·967		1·529	1·106	0·971	1
Weight per c.ft. in 60° Fahr. and 30 in.	0·0053	0·0429	0·0742		0·1173	0·0848	0·0745	0 0767
Volume per lb. in c.ft.	188 68	23·32	13·48		8·52	11·79	13·42	13 03
Volume of air for complete combustion of 1 c.ft. reduced to 60° Fahr. and 30 in.	2·38	9·52	2·38		—	—	—	—
Weight of air for complete combustion of 1 lb.	34 42	16·98	34 42		—	—	—	—
Calorific value gross, in B.Th.U. per c.ft. at 60° Fahr. and 30 in. (according to Lewes)	320	990	318	2301	—	—	—	—
Ditto (according to Lunge)	321	1003	321	2319	—	—	—	—

Air: O_2 = 21p.ct, N_2 = 78·05, X = 0·95

MODERN GAS.

After very briefly describing water gas, the paper went on to say that during recent years the composition and properties of coal gas have undergone very important modifications. Gas has always had to be supplied under severe statutory restrictions; and, with a very few exceptions, all gas undertakings were (before the war) obliged to conform to an illuminating power standard. The illuminating power of coal gas, however, depends almost entirely on those unsaturated hydrocarbons among which are benzene and toluene. The enormous expansion of the demand for toluene in particular, to provide the raw material for trinitrotoluene (the famous "T.N.T." of the high explosives), rendered it imperative to extract every ounce out of the gas. The illuminating standard was everywhere abrogated; and, as the calorific value of the unsaturated hydrocarbons is also very high, the calorific standard which was subsequently imposed to take its place was of necessity somewhat lower than the calorific value of the pre-war gas. Experience quickly convinced everyone of what scientists had indeed been convinced long before—namely, that the lower-grade gas could be consumed without difficulty in existing appliances, and that the volume of gas required was by no means so much greater as might have been anticipated from its lower value as revealed in the calorimeter. That is to say, not only did the new gas give the same results as the old, but the efficiency was higher. A greater proportion of the calories supplied to the gas-fire or furnace was given out in radiant energy.

The Gas Investigation Committee appointed by the Institution of Gas Engineers have already published three reports, based on a very large number of tests, on the subject of the relative efficiency of grades of coal gas, ranging from 600 to 400 B.Th.U. per cubic foot. The gist of their conclusions is that the calorific value of gas may be reduced to 400 B.Th.U. per cubic foot without reducing the heat efficiency of existing apparatus, provided that the necessary adjustments are made to the burners; and further that, with specially designed apparatus, a considerably higher heat efficiency can be obtained with gas of the lower calorific value than with that of the higher.

In January, 1919, the Fuel Research Board of the Department of Scientific and Industrial Research presented a report to the Board of Trade in which they recommended that the gas consumer should be charged definitely on a calorific basis. They recommended four standards, ranging from 400 to 500 B.Th.U. per cubic foot.

In August of this year, the Gas Regulation Act (1920) became law, giving effect to most of the recommendations of the Fuel Research Board, together with other recommendations put forward on behalf of the gas industry. This Act does not specify any particular calorific value; but it appears probable that a standard in the neighbourhood of 450 B.Th.U. per cubic foot will be adopted by most undertakings. This change in the standard of values necessitated modifications in carbonizing plants, as it has been found that the new gas cannot be economically obtained by the simple method of dry distillation, as formerly practised. The coal gas must be diluted in some way. More than one diluent has been proposed; but as a lengthy argument on this point would be wearisome, we content ourselves by stating that, in the opinion of most eminent authorities, the only proper diluent is water gas—obtained by the gasification of a portion of the residual coke.

BYE-PRODUCTS.

Coke is the principal bye-product of gas manufacture; and, after supplying heat for the carbonization process and carbon for the generation of water gas in the same retort, 8 to 9 cwt. of coke per ton of coal carbonized is available for other purposes. In the distillation of coal, about 11 gallons of tar is formed in the ordinary way; this quantity being considerably increased when "steaming" is practised in the continuous process.

Particular interest attaches to the uses to which the derivatives of tar were put during the war. The urgent need of the army for high explosives, and the difficulty of transport owing to the submarine campaign, were, to a great extent, countered by by the mobilization of the gas-works. During the war, the total approximate production by gas undertakings of substances of this nature was as follows:

Pure benzole	21,800,000 gallons
Pure toluol	8,000,000 ,,
Solvent naphtha	4,000,000 ,,

As high explosives, the above quantity of benzole represents about 1,200,000 tons of picric acid, and the toluol corresponds to about 65,300 tons of T.N.T.

The total production of tar during four years of the war (for which figures are available) was over 6 million tons, to which gas-works contributed $3\frac{3}{4}$ tons. The distillation of 5 million tons of this tar resulted in the production of about $1\frac{1}{2}$ million tons of creosote, of which nearly half was taken by the Admiralty for fuel oil.

It may here be mentioned that during the war period a number

of exhaustive trials were made for the Ministry of Munitions on the direct manufacture of fuel oil from coal carbonized in continuous vertical retorts. The trials, which were made on a Glover-West installation, demonstrated conclusively that this could be done; and a number of installations of continuous vertical retorts were actually taken over by the Ministry. It is interesting and important to note that, with adjustments of a trifling nature, large quantities of fuel oil were made for the navy in plant designed and worked at the high temperatures usual in gas-works practice.

Ammonia was briefly referred to, and then the lecturer turned to the screen, on which a selection of pictures were projected from lantern slides, illustrating the development of apparatus for the manufacture of gas. The horizontal retort was described as it existed prior to 1875, at which date Mr. John West produced the first practicable charging machine. A slide showing one of the earliest forms of this machine, with the inventor standing before it, was greeted by cheers from the audience, to many of whom his personality is well known. The history of the application of power to these machines, with the concurrent development of elevating and conveying machinery, the inclined retort, and the intermittent vertical retort of the Dessau type was rapidly traced. Coming to the continuous vertical retort, the paper goes on as follows:

The Continuous Vertical Retort.

In all the processes already referred to, a bulk of coal is placed in a heated enclosed vessel, left there over a definite period, and the residual coke withdrawn. The vessel or retort is, therefore, periodically empty and open to the atmosphere. The cold charge of material is suddenly introduced into the heated retort. There is, therefore, a decided loss of heat on this account, and the gas evolved during the period between charging and discharging must necessarily vary in composition. It was soon obvious on consideration that, if coal could be continuously fed to a retort under constant conditions of temperature, and passed through it at a constant rate, during which the gases would be given off and the coke continuously withdrawn after carbonization was complete, considerable economies could be effected, and gases would be evolved at all times in constant volume and of constant composition. Such a retort had been in operation for some time in Scotland for the distillation of oil-bearing shales. These retorts were designed and put into operation by the late Mr. William Young, when Messrs. Samuel Glover and John West saw their possibilities for the carbonization of coal. In the period, therefore, 1904-08, Mr. John West was designing and developing a process of continuous carbonization in vertical retorts at the same time that Mr. Thomas Settle and Messrs. Woodall and Duckham, among other investigators, were dealing with the same problem. By 1908, there were at least two systems of continuous carbonization in vertical retorts in practical operation, known as the Woodall-Duckham and the Glover-West systems.

The Glover-West system was chosen, for obvious reasons, for description in some detail; and this was illustrated by forty slides, covering details of the retort and setting and the most important fittings, photographs of some typical installations erected at home, in the Colonies and in foreign countries, together with a few examples of coal and coke-handling plants.

There is no attempt in the paper to go into detail with regard to the advantages of any one system of carbonization over another; but it is stated that systems of continuous carbonization in vertical retorts do offer some very definite reasons for their adoption in gas-works. The continuity of the process results, in itself, in an increased yield of gas residuals as well as a very appreciable increase in the heat efficiency of the process, a reduction in labour cost, and a very marked improvement in labour conditions.

Refractory Materials.

To take full advantage of modern methods of gas manufacture, nothing is more important than the high-refractory materials of which the retorts and their settings must be constructed. About 25 years ago, Mr. John West turned his attention to this matter, and established a factory in Derbyshire where deposits of the necessary siliceous materials are available. This material and the methods employed in turning it into the finished article were very fully described by him in a paper he read before the Manchester District Institution of Gas Engineers, on May 27, 1916.*

The method of working these materials was shown very clearly in the cinema film exhibited at the close of the paper. Coke-ovens, carbonization in bulk, and carburetted water gas plants, were briefly referred to, concluding with the following remarks.

Most of the larger installations in this country have manufactured a portion of this gas, in the region of 33 p.ct. of their total output, particularly during periods of maximum demand. The great advantage of this practice is that the plant can be very quickly put in and out of commission; but it may be doubted whether it will survive the complete development of the practice of "steaming" in continuous vertical retorts.

The other portion of the paper dealt with the application of gas to domestic and industrial purposes; and the following points are culled from it.

It is well known that gas, and particularly coal gas, is now being used in a great variety of ways in domestic and industrial life. It is not so generally appreciated, however, that its use is still capable of extension far exceeding its present limits.

* See "JOURNAL," Vol. CXXXIV., p. 442.

Domestic Heating and Cooking.

The solution of the problem of the smoke evil, together with that of the improvement of working conditions within the home, are undoubtedly to be found in the application of gas to all the purposes of heating and cooking in the house. We do not believe that any of the alternative proposals so far put forward, such as the suggested manufacture of smokeless solid fuel, show any likelihood of solving the problem. Nor do we believe that gas has yet been applied to the home in the best and most efficient way. It must not be forgotten that gas-fires have so far been introduced into houses designed for coal-fires. The gas-fire has been placed in front of the existing coal-fire grate; and the gas-stove has been installed, worse still, in a kitchen without any proper outlet flue or ventilation at all. No wonder the result has been headache and disappointment, in spite of which, however, these appliances are more and more widely distributed every day.

When, however, it becomes possible to begin in real earnest to build new houses and to construct them specially and properly designed for the reception of gas-fires, cooking ranges, and boilers, the entire absence of dust, the disappearance of the labour of fire-lighting and attendance, and the considerable saving in space due to the very much smaller flues and fire-places, will make the use of gas so popular that at any rate this aspect of the smoke problem will be solved within a few years.

Industrial Heating.

Nor do we believe that, great as is the present use of gas in an enormous number of industrial operations, it has anything like reached the extent that is desirable, both from the point of view of the smoke evil and that of the economy of fuel. We believe that gas will be used in the near future to effect all industrial purposes where heating, within the temperatures attained by coal, is required. Efficiency, cleanliness, saving in labour and in floor space are the rewards for the successful application of gaseous fuels to these purposes.

Conclusion.

In conclusion, it may be necessary to offer an apology for the length of this contribution. At the same time it has seemed preferable to put forward a general and broad outline of the technicalities and practice of the gas industry rather than confine it to one or two specialized types of apparatus. It is not fully appreciated by those not actively connected with gas engineering what a particularly wide range of training and experience is necessary to deal with the problems involved in the design of plant and apparatus for the manufacture and utilization of coal gas. The plant and machinery referred to call for knowledge and experience in the design of foundations, involving anything from a simple mass of concrete to a complicated arrangement of ferro-concrete rafting or piling, a knowledge of civil, structural, mechanical, and chemical engineering, and the proper application of steam and gas engines, electrical apparatus, and hydraulic power.

The gas undertakings of the United Kingdom represent a capital of 130 million sterling. They occupy a very important place in the activities of our municipalities, and contribute in many cases—whether rightly or wrongly does not come within the scope of this paper—to the relief of the rates. They are doing, and will continue to do in the future, extremely valuable service in the conservation of our coal supplies; and they have done, and will continue to do, useful work in the solution of the smoke problem of our great cities.

We need, then, for this industry engineers of high training and broad vision; but if no other useful purpose is accomplished by our contribution, we earnestly venture to hope that it will tend to create such an interest as to ensure that all possible opportunities will be provided by our universities and technical colleges, and in the engineering industry for the training of men required for this and allied branches of engineering.

At the conclusion of the paper or lecture, the cinematograph films were exhibited, accompanied by explanatory remarks as the several operations were depicted on the screen.

The proceedings terminated with a very brief discussion, in which the President (Mr. Pilling), Mr. Walthew, Mr. Mills, and Mr. F. W. J. Belton (of Macclesfield) took part.

In view of the fact that most of the members of the Manchester Association are mechanical engineers, it is gratifying to note that the attendance was large, and the audience very appreciative.

Well-Boring.—Two editions have already been exhausted of Mr. C. Isler's manual of current practice in "Well-Boring for Water, Brine, and Oil;" and now the author has prepared a third, and enlarged edition, which embodies the latest developments that have been introduced. Deep-well water supplies are now so popular, that a work of this kind is really of wide interest, particularly in view of the experience of the author as a hydraulic engineer. To large users, of course, the financial saving likely to attach to an individual water supply is a matter deserving of careful thought. Various means of raising water are dealt with; special attention being devoted in this connection to compressed air. Important information is given as to the aqueous formations of this country. The text is plentifully illustrated with types of boring apparatus, &c. Messrs. E. & F. N. Spon, Ltd., of No. 57, Haymarket, S.W., are the publishers of the book, the price of which is 16s. net.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT)

The Second Meeting of the Session was held on Saturday, the 20th ult., in the Glasgow Corporation Gas Department Workshops, Milan Street.

Mr. John M'Isaac (of the Glasgow Corporation Gas-Furnace Department) read the following paper.

GAS-FURNACES; THEIR RECOMMENDATION, FIXING, AND ADJUSTMENT.

While a knowledge of the constructional details of industrial furnaces is necessary, it is not so important to the representatives of gas undertakings as the methods of applying gas as a fuel; and, in view of this, I have chosen the latter as my subject to-night.

Recommendation of Furnaces.

Gas-furnaces may be grouped under three main headings: (1) Natural-draught furnaces; (2) forced-draught furnaces; (3) compressed gas and air furnaces. The distinctive features under each heading are various, and require explanation, so that we may be able to understand the reason prompting the recommendation of any one of them. It will be understood that just as there are various processes requiring different temperatures, there must be heating systems to deal with them successfully. It will also be evident that the system which proves the most economical and successful will naturally be the one likely to be recommended. But it does not follow that this will always be so.

If we take case-hardening as an example, which only requires a temperature not exceeding 925° C., this can be done most successfully with a natural-draught furnace when time is no object; but if we take the case of motor-repairers, who get many rush-jobs to do, it is then a matter for serious consideration whether it would be better to put down a forced-draught furnace. In such a case there are only two points to be considered. With the natural-draught furnace, no attention or running plant is required. It certainly takes longer to do the work; but the finished product is first-class, and the slight additional cost for fuel is negligible, since it is compensated for in requiring less attention from the operator. The forced-draught furnace requires the use of a fan or blower, which adds slightly to the running cost; but this is compensated for by taking less time to attain the required temperature, which means less gas consumed. The temperature is not so easily controlled, however, which necessitates much closer attention from the operator; and the product is not usually so good.

There are many similar examples to the foregoing; but each and all of them must be decided upon according to the main object in view. This should not be difficult to decide, if it is remembered that for all temperatures up to and including 1000° C. natural draught is the proper system. For temperatures above that, and up to 1500° C., forced draught should be used.

It will be understood that economy and success in conjunction with utility are essential features with any heating appliance, but there are many processes in which coal or oil would be quite as economical as, if not more so than, gas—having regard to the price of fuel only. This seeming drawback of fuel-cost is often the cause of many manufacturers hesitating to make a change in their heating plant. But if all the saving features attached to the use of gas are fully put forward and duly considered, there is little need for doubt as to the result being other than altogether in favour of gas.

As we are all aware, economy is the order of the day; and in no other direction is this more apparent than in the case of fuel. Having regard to the price of fuel only, as being the deciding factor in the question of installing new furnaces, various points arise which make it difficult to answer with any degree of exactness, because the amount of gas consumed in any furnace depends on three things over which we have no control.

First, upon the actual number of heat units contained in the particular gas used, which varies in different localities.

Second, upon the amount and kind of work, which is different in each case, and because every heat unit absorbed by the work in bringing up to the degree of temperature required must be supplied by the gas; its consumption being, therefore, proportionate to the amount of work done.

Third, upon the correct handling of the control valves and draught, which is a matter requiring the exercise of care by the operator, in order to obtain the best results at the least cost for gas.

Relative B.Th.U. Values.

If we take coal and gas as competitive fuels for industrial uses and compare the 14,000 heat units contained in 1 lb. of coal as being equivalent to 28 c.ft. of 500 B.Th.U. gas as a fair basis for the calculation of relative costs for fuel, the results would be entirely in favour of coal, as the following figures will prove. Take the current prices for coal and gas for manufacturing purposes in the Glasgow area, which are as follows:

Coal at 39s. per ton.
Gas at 3s. 7d. per 1000 c.ft.

Then 1 lb. of coal of 14,000 B.Th.U. = 28 c.ft. of 500 B.Th.U. gas. And 62,720 c.ft. of gas = 1 ton of coal.

On this reasoning, the relative fuel costs on a B.Th.U. basis would be as follows:

1 ton of coal at 14,000 B.Th.U. per lb. = 31,360,000 B.Th.U. at £1 19s. per ton.

62,720 c.ft. of 500 B.Th.U. gas = 31,360,000 B.Th.U. at 3s. 7d. per 1000 c.ft. = £11 4s. 9d.

This would seem to suggest that gas as a fuel was hopeless, which is not the case; and I will endeavour to illustrate by the following concrete example that the position is reversed and is very much in favour of gas.

A large gas-fired furnace recently installed for forging purposes, having an average gas consumption of 50,250 c.ft. per week, at 3s. 7d. per 1000 c.ft., represents 25,125,000 B.Th.U. for £8 19s. 2d. The coal-fired furnace which it displaced consumed 9 tons of coal per week at 39s. per ton, representing 282,240,000 B.Th.U., for £17 11s. This shows that coal fuel costs 95 p.ct. more than gas; and the difference in B.Th.U. to do the same class of work, with gas giving a 10 p.ct. increased output, is 91 p.ct. in favour of gas.

The reason for this difference is mainly due to the high efficiency and design of the modern gas-furnace, and also to the essential factor that in a gas-furnace the working and combustion chambers are one, whereas in the solid-fuel furnaces all heat is generated in a combustion chamber first, and then transferred to the working chamber. There is also the question of regenerators—a system which lends itself more easily to gas-fired furnaces than to any other class of fuel, and is mainly responsible for the recovery of much heat which would otherwise be lost in the waste gases.

All other types of gas-furnaces are more or less subject to the same reasoning in so far as fuel costs are concerned, which will only become higher in relation to their handling and suitability for the work expected from, and put through, them. In any case, I think sufficient has been said to prove that there is not the slightest doubt about the use of gaseous fuel being the best and most economical.

Fixing Industrial Appliances.

We now come to a subject which particularly concerns gas undertakings—viz., the fixing of industrial appliances; and while it is not recognized that we have the exclusive right to this class of work, it very often happens that our better knowledge of gas distribution, and the fact that gas consumers expect us to guide them in all matters relative to the best methods of using gas to their and our own advantage, compels us to take an intelligent interest in this class of appliance.

Without intimate knowledge of all types of appliances which may be sent into any district, the difficulty arises of deciding what gas may be consumed by each; and this naturally raises the question of what size service and meter will meet the specific requirements. Manufacturers will give the approximate consumption of any appliance they are asked to supply; but there is the question of the appliance supplied to the consumer without our being asked to give advice in the matter.

In a case of this kind, it is almost invariably the rule that the consumer is unable to give any information regarding gas consumption—not that the manufacturers have purposely withheld such information, but because it had not been considered nor asked for. The furnace catalogue of to-day is a very comprehensive book of reference for all concerned; but it does not give much information as to the approximate gas consumption of any specific appliance. I offer the suggestion to the makers that it would be of mutual benefit to purchaser, seller, and gas undertaking, if they could see their way to insert against each appliance the meter capacity required, as is done by gas-engine makers. The only indication or guide as to size of pipe required may be taken from the minimum diameter of the supply pipe as quoted from the catalogue; but even this does not give much help as to meter capacity.

Take for example that we are asked to supply and fix a meter and service for a natural-draught furnace measuring 36 in. deep by 24 in. wide by 12 in. high. Here we have a furnace having a gas-rail capable of delivering approximately 5000 c.ft. per hour at a distance of 15 ft. from meter to furnace. Yet the average consumption for this size of furnace is only 350 c.ft. per hour. It will be understood that the reason for this diameter of rail is to provide a reservoir; so that an equal pressure may be obtained over the whole series of burners—a very necessary precaution.

How, then, are we to arrive at the correct rule to determine an adequate supply? One way (and the safest) is to count the number of burners on the appliance referred to, and allow that each of them will pass 50 c.ft. per hour at 2-in. pressure as the minimum. This would require a 60-light meter. But it is always better to increase this by at least 100 p.ct. to allow for future extensions; and as a consequence of these deductions, the service dimensions are settled.

The foregoing is assuming a natural-draught furnace. But we have the air-blast too; and this again will give some trouble to the uninitiated, since there is a different type of burner. The effect of the compressed air, which sets up an injective action on the gas supply, must be considered. Below is a rough guide to determine what each burner will pass (in cubic feet per hour), assuming that an air pressure of 1 lb. per square inch is being used with the following gas connections at the burner: ½ in., 75; ¾ in., 250; 1 in., 350; 1¼ in., 450; 1½ in., 550; 2 in., 750. If the air pressure is higher, then these figures will be increased in

proportion to the square root of the increase of pressure; and it is a simple matter to calculate what the meter capacity will be, no matter what the air pressure is.

There are other systems of applying gas wherein it would be difficult to determine with any degree of exactitude what the minimum gas consumption would be—due to the fact that there are no burners in the true sense. Yet there are gas connections to take their places; and the same reasoning as is applied in the case of the air-blast furnace will suffice to settle requirements.

ADJUSTMENT, SYSTEM "A"—NATURAL DRAUGHT.

We now come to the most important item of any heat treatment installation—viz., the proper adjustment of the burners to give the correct ratio of gas and air mixture, and consequently the maximum temperature for the minimum gas consumption. With natural-draught burners, there is not much to give anyone the slightest concern; but it very often happens that, although the furnace itself is all right and the burners are carefully adjusted to give the correct flame, it is impossible to get near the maximum temperature expected; and this, of course, is often attributed to the quality of the gas supplied. In a few instances, this does happen; but it does not account for the extreme difference. The most important item with any natural-draught furnace is the draught, due to the fact that the pull exerted by it determines the volume of air passing through the burners as primary, and also the secondary air—whether it be through recuperators or at the burner-head. Then there is the question of the sight-holes and door opening. These are also susceptible to the draught; and if this is not set to a balance, the results are most unsatisfactory.

In starting-up a furnace for the first time, one would open the door and damper to their fullest extent, light the first burner, and the others would light from it. Having started them all going, next adjust the primary air so that the flame is not too keen, but just slightly removed from the white-tip stage. Next adjust the pressure to 20-10ths as a minimum with all the burners full on; and then close the door. The damper is then adjusted to give such a draught that, on placing a lighted taper at one of the sight-holes, the light is just balanced—*i.e.*, neither drawn inwards nor blown outwards.

This is only a preliminary adjustment; and since the increase of chimney temperature gives an increased pull, it is not possible to give the final adjustment until the maximum working temperature has been reached. It is only then possible permanently to adjust the burners, damper, and secondary air, so that no further attention should be necessary.

There is still the question of the pressure and quality of gas supplied, both of which are of vital importance in any gas-furnace, but more particularly in the natural-draught type, since it is more sensitive to such changes, and consequently shows a drop in temperature in proportion to the variation in either of them. One of these can be eliminated entirely—viz., the pressure—either by fixing a suitable governor on the gas supply, or by fixing a pressure-gauge between the main control valve and the furnace. The latter is only a makeshift, and should not be resorted to unless there is some good reason for doing so.

Regarding the change in calorific value of the gas and its effects, this is a much more difficult problem to solve; and, leaving scientific apparatus out of the question, the only other simple method I have tried, and found to work, is by inserting an upright bunsen burner, and adjusting the flame to approximately that at which the furnace burners are set. Should a change occur (observing at the same time that the pressure is that at which the furnace was first adjusted), you get the change in flame structure, and readjust the gas or air supply as the case may be.

As an example of what the adjustment of draught means to the successful working of any natural-draught furnace, the following is typical. I was asked some time ago to call on a certain firm to examine their furnace, as it seemed impossible to get the required heat—viz., 750° C. Although they were using the specified gas consumption per hour, it was only possible to attain 450° C. I took the rate of gas consumption which in this case was 450 c.ft. per hour, examined the burners, found them correctly adjusted, and finally the draught. This was found to be so strong that when the light was applied to the sight-hole it was sucked out. The remedy was obvious—draught adjustment—after which the furnace attained the correct temperature within thirty minutes. This is conclusive proof, I suggest, of all I have said with regard to natural-draught furnaces.

SYSTEM "B"—AIR-BLAST.

The air-blast system is one in which there are many vital points, the importance of which will, if ignored, lead to failure even in the most successful design of furnace. It need not concern us at present regarding the design or position of the burners, since we take it that the makers have done their best to employ all essentials for a successful appliance, provided it is properly fixed and adjusted. It is just this qualification which leads to the complaint that gas-furnaces are a failure, particularly with regard to their seeming inability to attain the required temperature for a reasonable gas consumption.

Needless to say, there is no doubt about the ability of gas to attain or maintain any temperature suited to most present-day uses for manufacturing purposes, provided it can be supplied in sufficient volume at a reasonable cost.

When it is fully understood that the results in any furnace are dependent upon the number of B.Th.U. delivered and consumed to the best advantage for the least cost, it is then possible for anyone to appreciate the fact that, unless strict attention is given to eliminate all possible risks of failure by ensuring an adequate supply of gas at a constant pressure and of unvarying calorific value, one cannot hope to achieve the standard of independence for the gas-furnace which it ought to have.

It has to be admitted that the diversity in the design of air-blast burners is a source of confusion to the uninitiated; but this need not give much concern, if it is understood that the principle of injecting and mixing the gas with the air is after the manner of a simple blowpipe.

There are, of course, what are termed gas and air mixers or controllers, which should not give any more trouble in adjusting than ordinary burners; but a brief explanation of their utility might assist in better understanding them, and the reasons prompting their adoption. Before doing so, I think it would be better to explain briefly why it is necessary to use air under pressure in preference to high or low pressure gas systems.

It is a well-established fact that it is very difficult to induce sufficient air for complete combustion with gas pressures through any burner designed for the purpose, and more particularly when it is attempted to apply the system to furnace work. There is no doubt about its being the ideal system, since the pressure is less subject to variation, and there is only one valve to control the mixture (instead of two, as is the case when air pressure is used). But the power and efficiency of the burner are reduced by the action of the back-pressure set up, due to furnace resistance; and that being so, we are compelled to reverse the action of the burner and make the air the inducing medium.

Every gas furnace has a minimum gas consumption rate per hour, below which it is impossible to attain the temperature for which it was designed to work; and it depends upon the following details what the type of burners and system should be. The design of furnace is the first question to be considered, and this will depend on the nature and load of work required per hour; and these two items, in conjunction with temperature, will decide the burner power. There is then the question as to the best position for the burners; and this, again, will depend on the aforesaid details. But it is safe to presume that, for all temperatures above 1000° C., air-blast at high or low pressure is absolutely necessary.

Having decided upon the design to suit the work and output, the combustion space available will determine which system is to be used, and to allow the combustion of the necessary volume of gas per hour. If the space is large, then a low-pressure system may be used, either natural or forced draught; but if it is restricted, the high air-pressure must necessarily be used—due to the fact that being compelled to consume a large volume of gas in a restricted space and in a given time results in giving high furnace resistance, and the greater this is, the higher must the air-pressure be, and the less likely the chance of using high-pressure gas.

Having regard to the terms high and low gas or air pressures as applied to furnace work, there are several systems in which it has been proved that low air-pressures, as from 2-in. to 6-in. water column, are quite sufficient for the highest temperature work. The greatest success achieved with the present-day type of gas-furnace does not require more than 6-in. as a maximum, to attain a working temperature of 1500° C.

There is one type of furnace in which there are no burners having a primary air supply, but gas connections are fixed at intervals along each side of the furnace. Some makers have introduced adjusters, and others only common stopcocks; but the main principle is the same—viz., to allow a given volume of undiluted gas to enter the furnace and supply sufficient air through regenerators to support combustion. This gives a white flame, which has proved to be the ideal furnace, for which there is and will be an ever-increasing demand in the future. There are, of course, many other types of furnaces in which such low air-pressures would be useless. These require from ¼ lb. to 5 lbs. of pressure per square inch to ensure that sufficient gas is consumed to attain the temperature required.

Regarding the simple type of burner, there is not much need to dwell upon its construction; but it is always well to remember that the gas connection is almost invariably at the side, and the air jet in a direct line with the outlet. Both supplies are controlled by means of simple stopcocks; and in some cases quadrant plates are provided to guide the operator as to fixing the ratio of mixture according to the pressures used.

I mentioned the gas and air mixers or controllers, and one may wonder why all makers do not adopt them, if it is a fact, as claimed, that they are so much better than the ordinary type of burner. Perhaps it is because they cost so much more, and that the increased efficiency is not enough to warrant their adoption. If we assume that these appliances only show a 5-p.ct. efficiency, this amount on a gas consumption rate of 200 c.ft. per hour would mean a saving of 10 c.ft., and at eight hours per day 80 c.ft., which would give a saving in fuel cost of approximately 3½d. per day (with gas at 3s. 9d. per 1000 c.ft.), which I venture to suggest is justification for their adoption.

It will be understood that there are various makes, all more or less having the same standard of efficiency. But there are others which act both as a mixer and mixture controller—that is to say, they have valves embodied in their construction which enable the mixture ratio to be permanently fixed and therefore obviate the necessity to re-adjust each time the furnace is required to be put

in operation. These are admittedly an acquisition to any furnace, due to the fact that the main control cocks are at full bore. This relieves the operator at all times from giving attention to adjustments, while it eliminates the possible risk of anyone fixing a control valve between the outlet of mixer and nozzles, which would result in air getting back into the gas-main. Such an occurrence happened recently and led to a suggestion that a back-pressure valve ought to be fixed on the gas supply, between the meter and the furnace. This is certainly a necessary precaution, and one to be advocated at all times where an air-pressure higher than the normal gas-pressure is used to create an explosive mixture.

There is also the question of the high-pressure gas and air systems, separate or mixed. With these it is necessary to instal special mixing and compressing apparatus, by means of which a combustible mixture is made and delivered to the furnace, not through two systems of piping as in the case of direct air-blast, but as a predetermined mixture of 3 of air to 1 of gas. In this case only a small volume of secondary air is taken in at the burner, and a very highly aërated flame can be obtained with such a system. There is also another feature peculiar to this system. It automatically stabilizes variation in gas and air pressures, due to the fact that the mixture is delivered to the furnace at a pressure round about a 10-in. water column, and of constant quality. These systems may also be used to advantage for lighting installations; and no doubt some of you will be more familiar with them in that direction than for industrial heating.

The question of flame temperature, as obtained by using any one of these systems, is the most important item in their application to furnace work; and what this is may be determined by several factors. The highest flame temperature will be obtained when the gas is mixed before combustion with exactly the volume of air which is required to complete the process. It is also dependent upon the calorific value, specific gravity, and pressure, all of which, together or separate, are responsible for much of the complaint that temperatures are constantly varying. If one or more burners on a furnace are adjusted for a given rate of gas consumption in the early part of the day, with definite gas-pressures, to give the maximum flame temperature, and no provision is made to deal automatically with the variations, the relative proportions of gas and air in the mixture vary, and consequently alter the flame temperature.

Another point which calls for consideration is the velocity of mixture; and in order that a burner may not light-back, the velocity of mixture in the tube must be greater than the rate of flame propagation. This fact compels us to use an air-pressure sufficient to ensure that the mixture pressure does not fall below 6-in. water gauge (which corresponds to a pressure of a ¼ lb. per sq.in. and a velocity of issue of about 150 ft. per second), particularly when we are dealing with very rich mixtures to attain high temperatures.

One other item in connection with this side of the subject which must not be lost sight of is that of the burner nozzle diameters. If these are too large, you will positively get firing-back unless you increase the air pressure to counteract the tendency; and it will result in increased consumption above that at which it is desired to work. As a rough guide to the diameter of nozzle to use for even the lowest air-pressure, it is pretty safe to allow an area equal to three-quarters that of the gas connection on the burner or injector, as the case may be; but these must not be too small, or undue resistance will be set up.

It will be evident from a consideration of the subject-matter of this paper that economy and success in the use of gas for industrial heating is dependent upon the use of the correct ratio of air to gas. It will also be evident that excess of gas is waste, except for certain special operations; and clearly excess of air leads to waste of heat, by increasing the loss by the flue, and finally by depression of the flame temperature in the furnace.

The fact that all heating appliances are subject to the slightest variation in either gas or air, has led to the introduction of what are termed mixture controllers. These are so designed that they may be attached to any furnace in which air-pressure is used. They differ entirely from the mixed gas and air appliances which I mentioned earlier; and I will endeavour to give a brief explanation of their function and how they act. Their main function is to maintain a constant quality of gas and air mixture irrespective of variation of pressure in the air-blast, the gas-pressure, or the resistance to the mixture, whether in the nozzle, the furnace, or the flues. One of the best examples of this type of controller is that recently put upon the market, in which a suitable form of governor is fixed conveniently on the gas supply between the meter and the furnace. This governor is automatically loaded by the variation of pressure which occurs in the special form of Venturi tube provided and supplied as a part of the apparatus, and having a small tube with the end cut on a slant, and projecting into the current of mixture passing through the injector. A small-bore pipe is connected between this point and the back of the governor; and by turning the slanted tube against the current, the pressures set-up in the pipe will vary over a considerable range. Should, however, the pressure in the small pipe exceed the gas pressure existing in the main, the governor would not properly respond; and it follows that the mixture pressure in the small pipe must always be lower than the minimum gas pressure. It is advisable to fix a pressure gauge permanently to the two connections provided—one to each leg; and if all is working correctly, the water should be level. In other words, the pressures are balanced; and as long as this condition is obtained, the mixture delivered to the burners will be maintained.

The chief feature with this type of controller is that the mixture pressure is used as the medium whereby fluctuations are compensated for. But I have invented one having a dual control—that is to say, if there be a drop in the gas pressure there is a corresponding drop in the air, or *vice versa*. The controller may also be adjusted for variations in calorific value. It is so arranged that it may be fitted on the gas and air supplies to any appliance, and adjusted to work with any air pressure (from balance upwards) and with any ratio of mixture. No matter what variations may occur, the mixture remains constant. Both of these controllers are being demonstrated in the furnace room here under working conditions, also most of the points which I have touched upon in my paper.

In conclusion, I wish to point out that what I have put before the meeting to-night does not pretend to be anything more than an introduction to a very fascinating, but very little known, branch in the subject of the gas-furnace. It has merely been my desire to point out the chief lines of study to be pursued, and to call attention to the essentials to be observed. I have not attempted detailed explanations of the scientific facts which govern the construction of furnaces, and the application of the different systems of generating heat, as there is sufficient subject-matter in that alone to provide the composition of a book.

DISCUSSION.

Mr. WALTER GRAFTON (Glasgow) said it was a personal pleasure to himself that he should be in a position to congratulate Mr. M'Isaac on his valuable paper. The pleasure arose from the fact that, to some extent, he had trained Mr. M'Isaac; and accordingly he felt justified in making some comment on the contribution they had had that evening. He felt rather sorry the author had not given more explanation as to compressed gas and air furnaces. With regard to ordinary natural draught, their gas supply in the district was a little lower than it should be; but they could not help this. It could not be obtained without high pressure air; and it was undoubtedly more economical than ordinary compressed air. Relative to back-pressure in the furnace, Mr. M'Isaac had shown that there must be a balanced pressure, in order to get the temperature they required. The propagation of heat was best developed when it was a little short of a white flame. There could be no disputing the fact that the natural gas supply with a natural air supply gave the best result, provided they had an ample supply from the street main.

Mr. S. H. HUNTER (Glasgow) said he felt certain the paper they had heard, and the demonstration they had witnessed, would be of considerable value to many of those present. He quite appreciated the fact that, in small works especially, there was a difficulty in obtaining information as to the working capabilities of gas-furnaces.

Mr. W. M. PATERSON (Tradeston) said the members would appreciate the fact that they required to have the gas first, before they could sell it. This was the chief difficulty with the majority of undertakings just now. The figures given by the author as to the comparative values of coal and gas were conclusive proof of the efficiency and economy of gas; and he was surprised that makers of gas-furnaces did not give detailed particulars of their services. If such detailed data were forthcoming—it was regularly supplied, as they knew, by makers of gas-engines—it was bound to be of infinite value.

Mr. J. BELL (Dumbarton) thought it would be of benefit if they could have the thermal analysis. A comparison with oil-furnaces, which he understood were being largely adopted just now, would be of advantage to the industry generally.

Mr. J. A. SMITH (Tradeston) said it seemed to him that the paper, while comprehensive and conclusive on most points, was lacking in one respect. He should have liked to have had particulars of the work done by the gas furnaces in case-hardening, for instance, as compared with similar work done in the coal-furnace.

Mr. J. M'INTYRE (Dawsholm) said it had always appeared to him there was a wide field for the gas-furnace. Indeed, he made bold to say that if manufacturing people got to know of the capabilities and possibilities of such a type of furnace, there would be a considerable extension in its use. Nowadays, uninitiated people were prone to think how many pounds of coal were used; but they entirely kept out of count one most important factor—namely, the amount of time taken up. It was well known that the coal-furnace required a matter of three hours; but, on the other hand, it was not so well known that quite a fair heat could be obtained in a gas-furnace in about half the time. It would be of interest to know if in Milan Street any experiments had been carried through with varying qualities of gas.

Mr. J. FRAZER (Dalmarnock) failed to see how they could have furnace resistance when they had balanced draught. In point of fact, they could not have any draught at all, unless they had forced draught. Then one other point struck him with regard to the author's method of arriving at the constituents of the gas through the upright furnace. No doubt temperature played a great part in furnace-heating, as well as in incandescent lighting; but he would be interested to know if the variant between lighting, heating, and furnace work was due to the characteristics of the upright furnace.

Mr. M'ISAAC made a short reply, the main points of which he supplemented and emphasized by a demonstration of furnaces in the room.

Estate of the value of £405,840, of which £394,896 is net personalty, was left by the Right Hon. Sir William Mather, D.L., of Bramshaw, Hants, Chairman of Messrs. Mather & Platt.

At a general meeting of the Illuminating Engineering Society, at the Society of Arts next Tuesday evening, a report will be presented by the Hon. Secretary (Mr. Leon Gaster) on progress during the vacation; and there will be exhibited some new developments in lamps and lighting appliances, illumination photometers, &c.

COKE-OVEN MANAGERS' ASSOCIATION.

(MIDLAND SECTION.)

The Midland Section of the Coke-Oven Managers' Association held their opening meeting last Saturday week at the Grand Hotel, Sheffield, when Mr. J. A. HEBDEN (Parkgate) delivered his Inaugural Address.

Mr. J. A. DAVY (the retiring Chairman), in opening the meeting, spoke very highly of the valuable work done in the past year by Mr. Hebden.

Mr. F. B. SMITH (General Secretary) read to the meeting an address forwarded by the President of the Association (Mr. William Diamond).

Mr. DIAMOND, referring to the objects of the Association, said: The Association was started to help managers by interchange of opinions, and to show one another's results; and I do say that the result has not been selfish. The manager alone has not received all the benefit, but the owners and the industry have been advanced by them. It was common knowledge that ethylene was absorbed by sulphuric acid, and under certain conditions and treatment would be converted with alcohol. It was, however, never developed commercially until copious work and deep study by a member of the Coke-Oven Managers' Association, Mr. Ernest Bury, M.Sc., of Skinningrove, brought the result to a successful issue. He found out most suitable temperatures, and economies in the operation; and I take this opportunity of offering him the congratulations of our Association. There may be many more of us with research work going on which will further extend the operations of the coke-oven industry.

To encourage experimental work of value by members, and to place before the Association their results in the form of a paper or address, the President gives the member a medal for the work done which, in the opinion of the Committee, has been of the most value. During the past year, though it has been one of the most troublesome, in labour and other difficulties, many good papers have been read.

The Government have made grants for research to several sections of the industries of this country. I do, however, think one of the most important is one which can give service to secure better utilization of coal and conservation of coal. Our industry is deeply concerned in both. To produce the greater bulk of our products it is necessary to have coal of coking nature. This coal is more valuable than non-coking coal. A question then arises: Where must a line be drawn which will conserve the coal between certain lines for the coking industry, and coal in other lines for fuel purposes? There is also the low-temperature distillation of coal to be considered; and I do believe a sound process of low-temperature distillation, by which a suitable combustible coke for household use was produced, would be a success. Our large cities would be glad to have such a material. I recently looked into an American process which appeared to be quite a success. I do know that the fuel was good, and that a material advantage in the quantity and quality of distillates was secured, which made the prospect good, and the financial side sound.

I allude to this because in all non-coking seams there is generally a large bulk of coal which it is difficult to dispose of. This may be most beneficially utilized by installing a process of low-temperature distillation, in which the distillates from the low-temperature are recovered. By the process which I have in mind, the granular coke is mixed with pitch, and again distilled at 1000° C., the result being all the ammonia and higher boiling distillates are recovered, and the paraffin cracked to benzole, &c. The idea can be developed with great results to our Midland Counties.

May I, in conclusion, suggest that owners of coke-ovens and colliery owners should form a tonnage subscription fund for setting-up experimental plant?

Mr. HEBDEN then took the chair, and said he had collected a few ideas, which he would like to put before them, as he thought that, by adopting them in some form or other, the best interests of the members of the Association as a whole would be served. He advocated some scheme for the collecting from the various journals, text-books, &c., of items of interest, with a view to their being printed and circulated among members. His point in suggesting this was that it was impossible, of course, for any particular member to read all journals, and thereby, no doubt, articles of interest were often missed; whereas if this scheme were adopted, members would be able to feel that they would have an opportunity of digesting any article bearing on their own or allied industries. If it was found impossible to print all the collected matter, the best only need be so dealt with. He referred to the development of the various bye-products from the commercial standpoint, and stated that the industry ought to be prepared for competition in the markets. On this point he suggested that the Association should set out a definite line for the investigation of this matter, so that they might not feel themselves tied-down to the manufacture of the particular product or products that they were at present turning out. Referring to the Association's Research Committee, while realizing that the Committee had been working under difficulties, he looked to it to help them on this particular point. He also said that there was great scope for experimental work on what are now termed "waste products" in the industry. In this respect, he felt that great help could be given by the formation of a reference library. At present there were no headquarters to refer to for enlightenment on any special detail. Another point that came to his mind was the interchanging of ideas with other kindred societies; and he suggested that it might be possible to arrange from time to time to hold joint meetings. He was of opinion that discussions with the societies that made a study of the various raw materials used in the industry, and with those who consumed the industry's products, would be very helpful.

Mr. J. W. LEE proposed a vote of thanks to Mr. Hebden for his address, which Mr. T. P. CARR seconded.

Mr. C. P. FIRM proposed a vote of thanks to the retiring Chairman, which Mr. RILEY seconded; the motion being carried with acclamation.

GAS INDUSTRY AND THE RESOURCES OF CHEMISTRY.

One of the points touched upon by Mr. George B. Cortelyou, in the course of his Presidential Address to the American Gas Association, was the mounting cost of all materials required in the manufacture of gas, which call for prompt and thorough search for means, not only to meet them, in the first instance, but later to point the way to such modifications or radical changes in methods as will relieve the industry from future avoidable expense. The long period of these steadily-rising costs without corresponding rise in income, which has so seriously handicapped the gas industry, the President went on, "impels us to a new consideration of means of effecting further economies and improvements in manufacture, distribution, and utilization, and especially in the technical processes involved in the extraction of bye-products. To do this, however, we must draw more extensively than we have done hitherto upon the resources of chemistry. Our industry furnishes the materials for a great diversity of chemical products used in the manufacture of innumerable articles indispensable to civilized life, for some of which it is the principal, if not the only, source of supply. It becomes, then, a matter of prime importance that we give renewed and intensive study to the development of more exact knowledge of the chemistry of our business, and as soon as, and in such manner as, may be practicable provide means for further investigation and research, to the end that we may not only realize the fullest returns from the operation of our plants, but confer a great public benefit as well."

Gas-Fitters in the Birmingham District.

The Industrial Court has issued its award regarding the arbitration between the Gas-Fitters' Trade Association and the Birmingham Gas Department, the Smethwick Gas Department, and the Birmingham District Master Gas-Fitters' Association. The Gas-Fitters' Trade Association applied for an advance of 6d. an hour. The claim was put forward in June this year; and representatives of the Gas Departments of the Corporations concerned were met in conference on June 30, though a settlement was not arrived at. On Sept. 3, the employers made an offer, which the Union declined to accept. In 1914 the men were paid a rate of 9d. per hour for a 55-hour week, and were receiving £2 1s. 3d. a week. During the war they had the general advances made from time to time in the engineering trade, and were at present being paid 1s. 11d. per hour for a 47-hour week, which yielded them £4 11s. 8d. per week. The Union contended that the present rate was low by comparison either with the rates of other workers—labourers, main-layers, and pipe-fitters—employed by the Gas Departments, or with the rates paid to builders' tradesmen. The employers replied that the increase in the rate paid compared favourably with that which gas-fitters had obtained in other districts, and with those received by workers of an equal degree of skill in other trades. They contended that the offer which they made in September would have given the men concerned a rate per hour 188 p.ct. above the rate they were receiving in 1914. The award states that the Court are of opinion that the employers' offer of Sept. 3 was a fair one; and they have decided that the rate of the men concerned who are fully qualified gas-fitters shall be increased to 2s. 2d. an hour. The decision will take effect as from Sept. 27.

The Gassaver Cooker Company has been registered with a capital of £15,000 in £1 shares. The office is at No. 3, Crown Court, Old Broad Street, E.C.

Hexham and the Gas Regulation Act.—Consideration was given at a special meeting of the Hexham Urban District Council to the application of the Hexham Gas Company to the Board of Trade for permission to charge 1s. 4d. per therm for gas. The Council's expert adviser, Dr. Dunn, presented his report; and after discussion, Mr. Knight moved that the application of the Company be not opposed. Mr. Civil proposed, as an amendment, that a strong protest be made by the Council against the proposed increased charge. The amendment was carried by five votes to four.

Gas Explosion at Moseley.—A gas explosion occurred at a private house at Moseley, Birmingham, on Thursday last. On coming downstairs, the tenant, Miss Fairfax, found that the house was being rapidly filled with gas. The escape was caused by a large brass chandelier in the front room having broken away from the supply-pipe and fallen. She promptly opened the doors and windows, had the broken pipe plugged, and after waiting a little time, believing that the gas had got away, a match was struck. The explosion which followed badly damaged the furniture, and Miss Fairfax was burned about the neck and face.

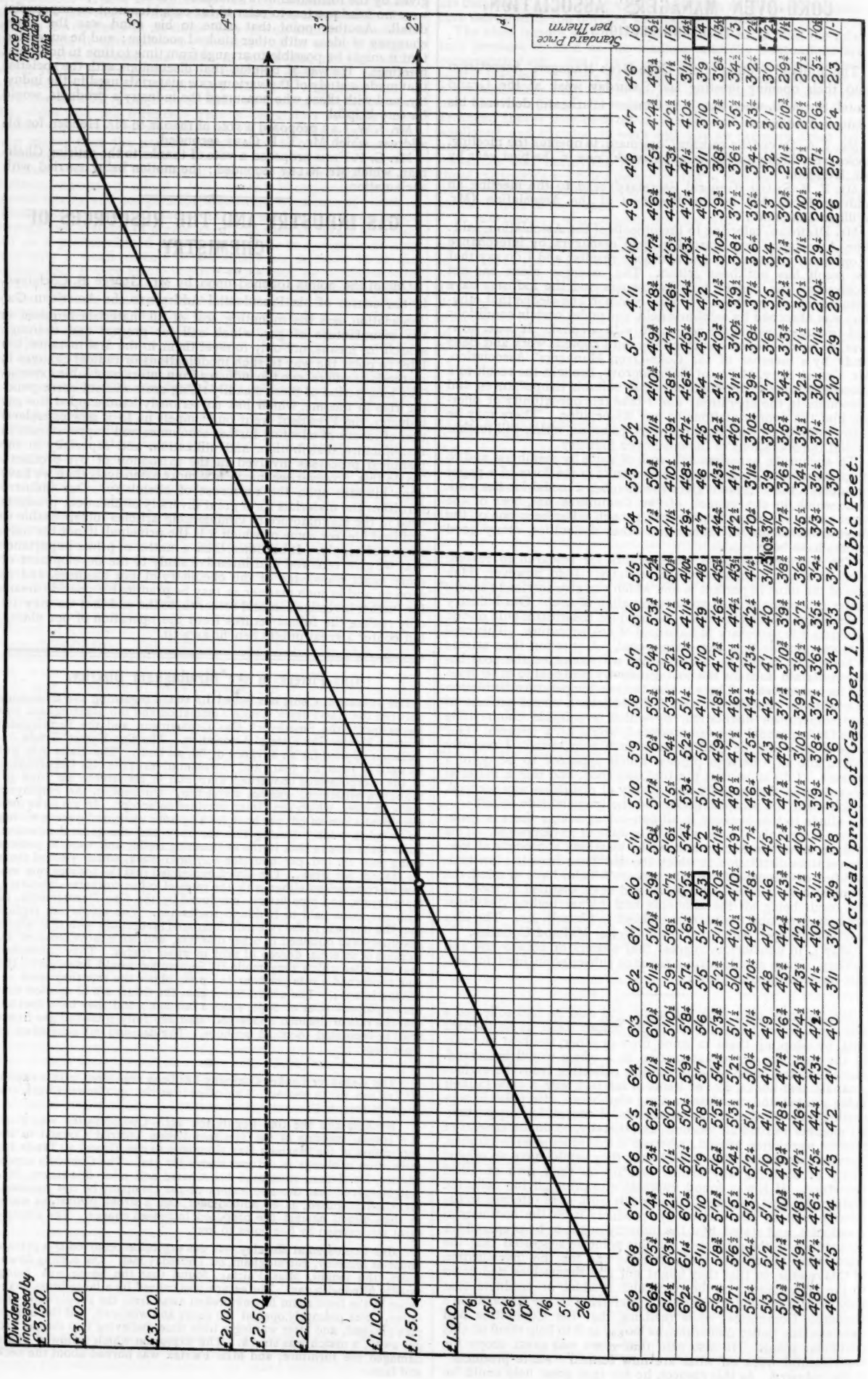


DIAGRAM SHOWING THE RELATION BETWEEN THE PRICE PER 1000 C.FT., THE PRICE PER THERM, AND THE INCREASE IN DIVIDEND.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

A Diagram of Therm Prices and Dividends.

SIR,—The diagram [p. 582] indicates at a glance the co-relation between prices per 1000 c.ft. and per therm, and the appropriate increase in dividend payable for various prices. Prices of the therm from 1s. to 1s. 6d. are tabulated; and the table may be constructed to any set of conditions, once these are known.

The diagram shown is based on a 450 B.Th.U. gas, and is constructed on the old standard of 500 B.Th.U. gas at the standard price of 2s. 10d., with the usual 2s. 6d. slide in dividend. Two specific cases indicating the use of the diagram are shown in full and dot-and-dash lines; and it will be seen that information is readily got at without calculation.

J. P. M'CRAE, Assistant Engineer.

Derby Gas Company, Nov. 30, 1920.

The Rendering of Consumers' Accounts on the "Therm" Basis.

SIR,—The preliminary steps towards obtaining Orders under the Gas Regulation Act have been taken in many cases; and it becomes necessary to consider betimes how best to give effect to the implied obligation to charge "for thermal units supplied in the form of gas" [Section 1 (i)].

The Act does not state that gas accounts shall show directly the number of "therms" charged for; and I venture to submit that the all-essential requirements would be complied with by a form of account which shows the index-readings and quantity registered as consumed (as heretofore), and also the price per "therm" and the amount payable—provided that the method of conversion from volume to "therms" is intelligibly explained.

This point is best illustrated by an extract from an imaginary account:

MIDSUMMER QUARTER, 1921.

To Gas supplied per meter.

June 30.	State of index. . . .	7'3 8	
	Deduct preceding index.	6'6'2	
	Quantity		7.600 c.ft. at 1s. 1'6d. per therm £2 0s. 6d.

NOTE.—1000 c.ft. of gas equals 4'7 "therms" the value declared by the Company—viz., 470 B.Th.U.

This is all the information needed in order to check the accuracy of the account by that relatively small number of consumers who do in practice verify before payment.

The advantage which the office will gain is that no additional columns or entries in gas ledgers or summaries are requisite; and the clerks can (in pricing-out the bills) work as heretofore on tables giving the direct reference from quantity to money charge.

In the imaginary instance above, it will be seen that the price per 1000 c.ft. is:

$$13'6 \times 4'7 \text{ or } 63'92\text{d.}$$

from which the calculation table is readily prepared.

As, until such time as meters which register in "therms" come into vogue, it is only reasonable to acquaint the consumer with the quantity of gas registered, a form of account which expressly states the number of "therms" charged for means duplication of work.

The additional book-keeping involved in keeping record of the consumption of individual consumers in volume as well as in "therms," and the expense of the clerical salaries entailed, is not to be lightly regarded in these days, when economy of administration must be most sedulously sought after in every practical direction.

W. W. TOPLEY.

Croydon Gas Company, Dec. 2, 1920.

Circular Letter Nuisance.

SIR,—After perusing the enclosed letter, possibly you will consign it to your waste-paper basket, as no doubt you are receiving many such enclosures from indignant gas officials.

It seems to me extraordinary that the controllers of an undertaking of importance like the one in case should be capable of circulating such a letter throughout the industry.

I may add that even the usual stamped and addressed envelope was not enclosed.

R. R.

Dec. 6, 1920.

[ENCLOSURE.]

City Chambers, Edinburgh, Nov. 29, 1920.

GAS DEPARTMENT.

Dear Sir,—The Town Council of this burgh have taken over the gas undertaking formerly administered by a Commission, and are considering the question of the organization of the department.

Certain officials wish to retire, including the engineer, who has also acted as manager of the undertaking. It will be a favour if you will inform me as to the duties entrusted to the gas engineer in your city—whether, *e.g.*, he advises as to new constructions and carries on the management of the department, and what salary is paid to him.

The finances of the gas undertaking and the collection of the revenues will be added to the existing finance and collecting departments of this city. I shall be glad to know if this is the system in your city.

If you can suggest any other points of importance in connection with the subject of organization, I shall be obliged.

A. GRIERSON, Town Clerk.

REGISTER OF PATENTS.

Vertical Gas-Retorts.—No. 135,214.

SOCIÉTÉ ANONYME D'OUGRÉE MARIHAYE, of Flemalle-Grande, Belgium.

No. 28,360; Nov. 15, 1919. Convention date, Sept. 28, 1916.

More particularly, this invention relates to vertical retorts of rectangular cross-section, having a series of outlets formed in the end walls, which are not directly heated by the furnace gases—the object of the invention being to avoid, as far as possible, the overheating of the products. The unheated walls present openings arranged along, or parallel to, the V-shaped "pasty layer" of the charge, which "enable the volatile products to proceed to the gas-collecting compartments provided on both sides of the retort."

Fig. 1.

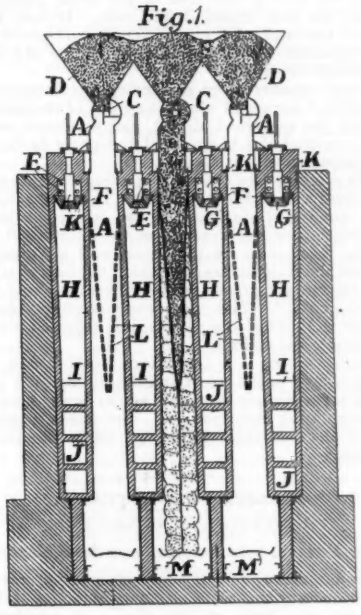
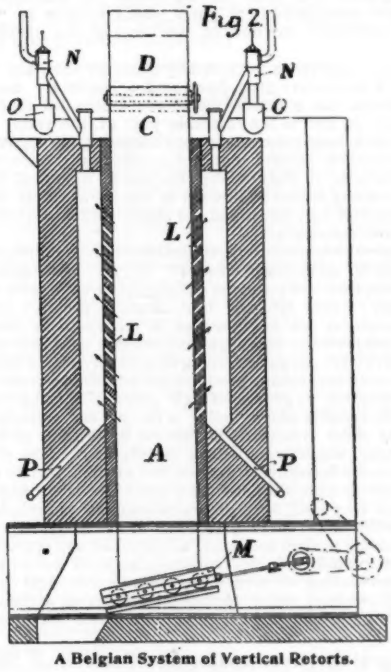


Fig. 2.



A Belgian System of Vertical Retorts.

Fig. 1 is a transverse vertical section of a setting containing three retorts—the middle retort shown full of coke and coal, whereas the two side retorts are supposed to be empty. Fig. 2 is a section through one of the retorts.

The distilled products are withdrawn at practically the same temperature as that at which they are distilled through openings made

in the unheated walls located in a V shape outside the pasty layer, but in its immediate neighbourhood. The volatile products can thus escape horizontally; and consequently they only go through the coke zones, the temperature of which is equal or inferior to the temperature at which they were formed. This arrangement thus reduces the length of travel of the distilled vapours through the charge of coke—"consequently eliminating the overheating and its detrimental effects on the distilled vapours."

These principles are realized in the setting shown, which consists of a series of vertical retorts of refractory materials, the horizontal section of which is rectangular. The width of the rectangle increases towards the bottom, so that the retort opens out while the length remains constant. Each retort is surmounted by an iron body A, which is not heated and always kept full of coal. Above this is a feeding valve C, of any gas-tight type, which separates the retort from the coal-bunker D. The retort is heated on its two longitudinal faces. The inlets for gas E and air F, and also the burners G, are at the top of the pillars H. The combustion products descend inside the pillars down to about the lower third of the retort. At this place they change their direction, turn round the lower edge of the vertical wall I, and go up again through a flue along the wall of a compartment contiguous to one of the transversal non-heated faces of the retort. When again at the top of the pillar the combustion products escape towards a collector, which takes them to the chimney or to some apparatus for recuperating the last part of their available heat.

The air required for combustion is admitted at the base of the pillar and heated in the flues J, provided in the lower part of the pillar, at the expense of the heat stored in the coke. It then rises through a passage, along the wall of a compartment contiguous to the second transversal unheated wall of the retort. Then the air reaches the burner G through the flue K.

The gases and vapours given off during distillation leave the retort through the slots L arranged along the trace of the pasty layer on the separating wall (as explained above), and as shown on fig. 1, which represents in one part the V shape of the pasty layer and the corresponding arrangement of the slots L.

The volatile products are collected in compartments subjected to the action of the heat radiated by the walls. They thus form free spaces wherein the quality of the gas and tar is said to be improved by moderate heating, obtained either from the returning "smoke," which has licked the main walls of the retort and is already appreciably cooled, or from the combustion air, which "is less overheated than in the ordinary regenerating ovens, since its temperature remains lower than that of the coke." The compartments might also be heated by burners similar to those of the retorts, but supplied with less quantities of combustible gas and air.

The apparatus shown is a continuous working one. The regular descent of the charge in the retort and the elimination of the coke are secured by an arrangement provided at the lower part of the retort, such as an oscillating conveyor M. The gases escape through the valves N and the hydraulic mains O; while the tar is evacuated through the leads P.

Retorts.—No. 141,025.

KENNEDY, J. E., of New York.

No. 5220; Feb. 20, 1920. Convention date, March 31, 1919.

This invention relates to retorts comprising a horizontally disposed shell adapted to rotate between stationary feed and discharge heads abutting against two ends of the shell. It consists of a combination and arrangement of parts which involve as "an essential feature a particular method of discharging the products of distillation."

The retort comprises a horizontally rotatable shell and end trunnion members; a stationary feed head and a stationary discharge head abutting against the trunnion members; means for feeding material for treatment in, and to the rotatable part of, the retort through the stationary feed head; means for withdrawing the gaseous products from the rotatable retort; means for effecting the discharge of the residual products of distillation, comprising a conical deflector and material elevating blades positioned at the entrance of the rear trunnion member and between it and the shell; and means for heating the rotatable shell externally.

The patentee concludes his specification with the remark: There are many practical advantages attained by my essentially horizontal rotatable retort for the purposes designated as compared with the use of stationary vertical retorts. For instance, the raw materials and resultant products are manipulated at a convenient level; the raw material is subjected to thorough and uniform treatment in its passage through the retort—all parts coming into direct contact with the heated shell; the resultant gaseous products are withdrawn from the retort in a nascent condition as generated; all parts of the shell of the retort are heated thoroughly and equally; a rolling and turning-over of the raw material under treatment is insured by the use of one or more cascading longitudinal ribs within the shell; the flow of all but the gaseous products is assured from one end of the retort to the other by the reciprocating feed, the conoidal shape of the shell, and the transfer means at the rear end, &c.; all extraneous air is excluded from the retort. Furthermore, there is no waste of raw material, since all the gaseous products desired are positively distilled and extracted from the raw material treated, and this without danger of loss of gaseous products by over-heating of even more delicate chemical constituents—the gases, as evolved, being forthwith withdrawn without dangerous contact with the heated raw material from which they generated.

Destructive Distillation of Wood and Similar Carbonaceous Substances.—No. 152,741.

POORE, P., of Paternoster Row, E.C.

No. 17,728; July 15, 1919.

This invention has for its object to carry on the distillation under such conditions as to secure a high yield of acetic acid, wood, naphtha, or other distillation products, by admitting steam into the retort at a temperature of from 180° to 270° C. throughout the active period of distillation or for a period extending over the time during which the exothermic reaction takes place, which commences on the charge reaching a temperature of about 270° C.

In carrying the invention into effect stationary cylindrical retorts are employed into which superheated steam is admitted at the bottom from a perforated pipe extending the length of the retort as described in patent No. 13,321 of 1917. The patentee says he has found that if the superheated steam on passing into the retort has a temperature of from 180° to 270° C., a very high yield of acetic acid and other distillation products will be secured under the conditions there prevailing—particularly during the exothermic reaction.

The retort itself is described in a co-pending patent No. 812, dated Jan. 11, 1919.

Controlling the Supply of Gas to Cooking Apparatus.—No 152,883.

PERLICH, C. C. A., of Leipzig-Sellerhausen, Germany.

No. 29,467; Nov. 26, 1919.

This invention relates to a device for controlling the supply of gas to cooking apparatus. This consists of a body adapted to alter its size through the influence of the temperature of the contents of the cooking-vessel and to act thereby upon a valve in the gas-tube in order to regulate the supply of gas to the cooker. This extensible body (mounted upon the lid of the cooking-vessel) can be regulated for various temperatures, so that it begins to act (for example) at 80°, 90°, or 100° C. The device is constructed so that the gas-supply is not completely shut off—a small flame serving to maintain the contents of the vessel at the proper temperature, being kept burning. The device could further be constructed so that, when the contents of the vessel cool to a determined degree, the gas supply is automatically increased.

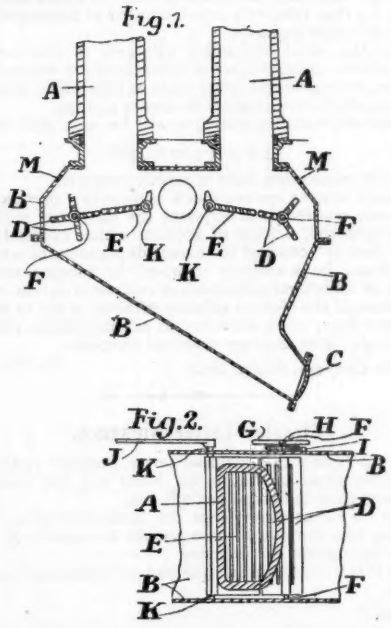
Discharging Vertical or Inclined Retorts. No. 153,540.

R & J. DEMPSTER, Ltd., KNIGHT, H. S., and SIDDALL, F. J., Manchester.

No, 18,820; July 6, 1920.

This invention has for its object to provide means whereby the whole of the coke in a retort or chamber may be discharged, or, alternatively, only a portion thereof, at will.

Thus during ordinary working, portions only of the coke may be discharged at intervals, a fresh charge being fed into the retort to make up for the material withdrawn—the gradual falling-down of the fuel during carbonization giving satisfactory results. On the other hand, at longer intervals the retorts may be completely emptied, in which case feeding of the retorts for some time prior to the emptying process could be discontinued.



Knight and Siddall's (R. & J. Dempster, Ltd.) Discharger for Vertical Retorts.

In the illustration, one means is shown for carrying out the principle named, with respect to a pair of vertical retorts. Fig. 1 is a sectional elevation of the lower portions of the retorts and a casing for the coke below the retorts. Fig. 2 is a sectional plan view of a part of fig. 1 only.

The lower ends of the retorts are in communication with the interior of the casing B below, which is capable of being closed or opened by the operation of a door C—in the latter case for the purpose of abstracting the coke. Below each retort are a pair of devices D E forming fire-bars or grates upon which the heated coke above rests. Each grid D is provided in multiple form, or with a number of arms

forming it, and capable of being rotated upon a shaft or axle F passing through the casing, and under the control of a hand-wheel G. The shaft also has attached to it a ratchet wheel H engaged by a pawl I (fig. 1) for preventing motion of the shaft in an undesired direction.

The partial rotation of the shaft at suitable intervals will allow one arm of the device D to fall away from the supported coke and thus permit the latter to fall into the casing B until such time as another arm comes into the initial position of the former one. This rotary movement may be continued as long as desirable, or it may be restricted in each case, so that movement ceases when a second arm arrives at the supporting position.

At such times as it is desirable to empty the retorts at one operation, the device E in each case may be operated. That is to say, a shaft K, on which the device E is mounted, is controlled by a lever arm J outside the casing; the operation of the arm enabling the grid E to be lowered sufficiently for the purpose stated.

In the examples shown, each device E is formed with a projecting part or ridge for helping to keep the material from unduly rolling or falling-over towards the central part of the interior of casing. This is advantageous in cases where a gas inlet or outlet is situated between a pair of retorts and below them. Such an aperture L might be used, for example, as an inlet for the water gas, when desired to be passed into the retorts.

Where the supporting part of the device E has greater area than the supporting part of the device D, a larger bulk of material in the former case will fall from the retort above, when E is opened, than when the device D is placed in an open position. But it is clear that if the supporting parts referred to were of similar area, the opening of one device would release a portion of the material, and the opening of both devices would release a considerably greater amount in the same time. A single arm might be provided for the device D, so that a complete revolution would be necessary to close the aperture after an opening operation thereat. On the other hand, more than three arms, as shown, might, in some cases, be possible.

In fig. 1 poke-holes are shown at M; but other conveniences or necessities for the working of the whole could be added without departing from the nature of the invention.

APPLICATIONS FOR PATENTS

[Extracted from the "Official List" for Dec. 1.]

Nos. 32,829 to 33,574.

ASHLEY, H.—"Pressure-reducing valves." No. 32,882.
BEESTON, W. G.—"Regenerative furnaces." No. 33,082.
BERRY, J.—"Prepayment mechanism for gas, &c., meters." No. 33,023.
BISHOP, T. J.—"Liquid-meters." No. 33,563.
BROTHERTON, W. J.—"Valves." No. 33,481.
BUTLER, P. H.—"Incandescent gas-burners." No. 33,145.
CHANDLER, D.—"Apparatus for determining calorific value of combustible gases." No. 33,036.
CHANDLER, D.—"Determining calorific value of coal gas, &c." No. 33,037.
CRAGGS, E. F.—"Gas-fired bakers' ovens, annealing-furnaces, &c." No. 33,485.
EHRAT, A.—"Production of petroleum and natural gas." No. 33,461.
EVANS, E. V.—See Chandler. No. 33,037.
FABINI, H. V.—"Manufacture of incandescent gas-mantles." No. 33,428.
FORTI, V.—"Apparatus for lighting and extinguishing gas-burners at predetermined times." No. 33,345.
GILL, H. & J. H.—"Valves and cocks." No. 33,350.
GOAD, F. L.—"Dry gas-meters." No. 33,019.
GROUT, C. C.—See Butler. No. 33,145.
HARDEL, J. A.—"Gas heating-apparatus." No. 33,568.
HIBBERD, C. E.—See Goad. No. 33,019.
HILL, J.—"Dry gas-meters." No. 32,954.
HOLLINGS, H.—See Chandler. No. 33,037.
JENKINS, A. ROGERS-.—"Coin slots." No. 33,408.
JENKINS, A. ROGERS-.—"Coin-box mechanism for coin-in-slot machines." No. 33,409.
JENKINS, A. ROGERS-.—"Coin-collecting boxes for coin-in-slot apparatus." No. 33,410.
JONES, S. F.—"Gas-ovens." No. 33,334.
MAYLOR, J. A.—See Berry. No. 33,023.
METERS, LTD.—See Berry. No. 33,023.
OLDFIELD, J. W.—"Portable stands for economizing heat from gas-burners." No. 32,959.
PANZA, F.—"Gas-making apparatus." No. 33,464.
RAMBUSH, N. E.—"Gas-producers, &c." No. 33,444.
RICHMOND LIGHT MANUFACTURING COMPANY.—See Fabini. No. 33,428.
ROBERTS, W. E.—"Globes for lighting." No. 33,226.
ROGERS, R. J.—"Coin-freed gas-meters." No. 33,100.
ROGERS, R. J.—"Ventilators or guarded outlets for air-shafts, gas-flues, &c." No. 33,381.
SELAS-TURNER COMPANY.—"Globes for gas-burners." No. 32,843.
SMITH, F. A.—See Butler. No. 33,145.
SOUTH METROPOLITAN GAS COMPANY.—See Chandler. Nos. 33,036, 33,037.
STATINEANU, E.—"Catalytic process for obtaining reactions between gas and another substance." No. 32,932.
TIPPER, G. E.—See Hill. No. 32,954.
TURNBULL, J. W.—See Rogers. No. 33,100.
TURNER, E.—See Selas-Turner. No. 32,843.
VILLIERS, P. G. T. DE.—See Jenkins. Nos. 33,408, 33,409, 33,410.
WALKER, W.—"Apparatus for converting light into heat energy." No. 33,106.

PARLIAMENTARY INTELLIGENCE.

NOTICES GIVEN FOR BILLS (SESSION 1921) RELATING TO GAS SUPPLY.

[Concluded from p. 527.]

Colne Corporation.—Among the objects of a General Bill to be promoted by the Colne Corporation are to enable them to increase the maximum charges for gas, and to have conferred upon them further powers in regard to the undertaking; to substitute a calorific test for the illuminating power test; to secure authority to lay mains in private streets; and to empower them to fit-up show-rooms.

Leicester Corporation.—Included in an Omnibus Bill of which the Leicester Corporation have given notice will be clauses relating to the gas undertaking. They will seek authority, upon lands scheduled, to construct and improve gas-works, and works for other purposes connected with the undertaking; to prescribe, regulate, and control the size and material of consumers' pipes, appliances, and fittings, and the position of meters; to provide for the enforcement of such regulations by penalties or otherwise; and to make new or substituted provisions with regard to the application of the revenue received by the Corporation in respect of their gas undertaking, including power to increase the amount which may be set aside to provide a gas-works renewal fund, to make contributions to any gas accident fund which may be formed under the authority of the intended Act, and to form a fund for working capital.

Wigan Corporation.—Another General Bill of which notice has been given is for the Wigan Corporation, who are including various clauses relating to the gas undertaking. These clauses are to empower the Corporation to lay pipes in private streets; to make provision as to the construction and placing of pipes and fittings between the Corporation mains and the meters through which the consumers are supplied; and to extend the powers of the Corporation in regard to the entry of premises and the removal of fittings belonging to them. The Corporation also wish to alter or repeal provisions of existing Acts relating to the maximum price chargeable for gas; to substitute a calorific power standard for the present illuminating power standard, to provide for the supply gratis to consumers of new burners suitable for burning gas of the quality prescribed under the proposed conditions as to standard and testing; to charge for gas by thermal units; and to establish a fund or funds for meeting expenses arising by reason of accidents, strikes, or circumstances beyond their control in connection with their gas undertaking, and any expenses incurred in the replacement and removal of plant. The Corporation will ask for power to require persons using gas for the purposes of internal combustion engines to provide effective silencers, and to inspect and test such silencers. One of the financial clauses will be to empower the Corporation to make a scheme for equating all or any of their loans, and to prescribe the periods within which such loans shall be paid off; and to sanction a scheme for the equation of the periods within which the several loans or some of the loans of the Corporation outstanding at the time of the passing of the Bill, or any of them, shall be paid off. Another will be to provide that, in the event of the bankruptcy or liquidation of any consumer of gas, water, or electricity supplied by the Corporation, any payments or charges due from such consumer to the Corporation shall be given priority over other debts, or to make such other provision as may be deemed expedient.

HOUSE OF LORDS.

Housing Schemes and Smoke Abatement.

Lord NEWTON, on behalf of Lord Hamilton of Dalzell, asked what steps had been taken by the Minister of Health to ensure consideration being given to the recommendations contained in the interim report of the Departmental Committee on Smoke and Noxious Vapours Abatement by local authorities or other bodies or persons carrying out housing schemes with the assistance of a Government subsidy. Everyone, he said, who has studied the question was aware that half the smoke, or approximately half, with which they were afflicted in this country was produced by domestic houses and chimneys; and there was no legislation which touched the question of domestic smoke at all. It was quite obvious that the present was a unique opportunity for dealing with this grievance, in view of the enormous number of houses now being constructed throughout the country, largely subsidized by the Government. In these circumstances it seemed only natural that the Government should have power to enforce, if they so chose, certain restrictions with the idea of abating the evil. The recommendations referred to would not, in the opinion of the Committee, have caused any extra expenditure, would have abated the nuisance, and, what was equally important, would have saved the consumption of raw fuel. The Committee further recommended that, where it was feasible, sanction should be withheld from these new houses unless the recommendations were complied with—except, of course, where there was manifest inconvenience in so doing. He complained that the official organ "Housing" contained only an emasculated and abbreviated account of the Committee's interim report, without any comments upon it whatever, and without any intimation that it was an official report.

Viscount SANDHURST replied that before the issue of the Committee's interim report, the attention of all housing authorities was called, by means of "Housing," to the unsatisfactory nature of coal heating, and urging the advantage of heating by other means. Then, on the issue of the report, the attention of the local authorities was again directed to it by further articles; and the report was summarized and its recommendations set out. In later numbers particulars were given, illustrated by detailed plans, of heating, hot-water supply, gas-fires

designed to reduce smoke, and so on; and again the Housing Commissioners of the Ministry of Health were instructed that, where gas was obtainable, coal-fires should be reduced to a minimum, and confined, if possible, to the living rooms—gas-cookers being installed and gas-fires being provided in various rooms. This practice was in accordance with the recommendation of the Committee on Smoke Abatement. Appropriate methods for the use of gas had been discussed with the "Gas Association," and specifications agreed upon had been brought to the notice of the local authorities. Arrangements had been made for the erection of sample huts at Acton as demonstrations of particular methods of construction, and in a number of them methods of heating avoiding the creation of smoke were being installed. The Ministry required, in connection with housing schemes submitted to them, that the question of reducing smoke should be really considered; and two important schemes were being carried out—central hot water supply in these cases being installed. One was a scheme at Manchester of 2700 houses, and the other at Salford of 700 houses. In addition, instructions were given to all the Housing Commissioners to bear in mind the recommendations of the Smoke Abatement Committee; and a special memorandum had been issued, or shortly would be issued, to the local authorities bearing directly on the report.

HOUSE OF COMMONS.

Scientific Glass Industry.

Sir P. LLOYD GREAME, replying to a question addressed by Mr. Hailwood to the Lord Privy Seal, said he was aware of the difficulties of the scientific glass industry in this country, and he was giving the matter full consideration.

Output of Home Produced Benzole.

Sir R. HORNE, replying to questions by Sir H. Brittain, said that the average monthly production of refined benzole in the United Kingdom during the first nine months of the current year was understood to have been approximately 1,650,000 gallons, compared with an average monthly production during 1918 of 2,200,000 gallons. He was not perfectly certain what the causes were for the reduction. His own impression, however, was that the reduced output of coal had had the effect of reducing the output of bye-products.

Public Utility Companies (Capital Issues) Act.

Copies were presented of reports of applications to the Board of Trade under the Public Utility Companies (Capital Issues) Act, by the Shrewsbury Gas Light Company and the Stretford Gas Company.

LEGAL INTELLIGENCE.

A FARMER AND COKE-OVEN FUMES.

At the West Riding Assizes, before Mr. Justice RIGBY SWIFT, the hearing of an action was begun last Thursday, in which Mr. Joseph E. Abson, a farmer, of Glasshoughton, near Castleford, sought to recover damages from the Yorkshire Coking and Chemical Company in respect of injury to his crops by fumes from the Company's works, which almost adjoin his land. Plaintiff asked for an injunction.

Mr. MORTIMER, K.C., and Mr. R. H. SHEPHERD represented the plaintiff; Mr. WAUGH, K.C., and Mr. WATSON, the defendants.

Mr. MORTIMER stated that the plaintiff farmed about 35 acres, and near by was a battery of 120 coke-ovens, which emitted fumes when they were being charged and discharged. Each operation lasted about ten minutes, and during this time clouds of fumes and gas were given off to a height of about 12 ft. They were so bad that a man who had suffered a gas attack in France was affected; and coughing and sickness was caused among the farm hands. A house 400 yards away had to keep its doors closed when the coke-ovens were discharging. The clouds of yellow-brown fumes settled on the plaintiff's land and had in recent years seriously damaged his growing crops.

Plaintiff said turnips, barley, clover, and other crops suffered. Some of the leaves and plants were killed, and in other cases there was a falling-off in yield. Young plants were burned as they came out of the ground.

Mr. *J. C. Bartle*, valuer, described the damage which he said had been done to the plaintiff's crops. The leaves were shrivelled, as if they had been singed. Apart from the fumes, the crops promised well. There was not the slightest sign of damage being due to defective drainage, nor any sign of a shortage of manuring. The land was quite clean.

Mr. *J. W. Bentley*, another agricultural valuer, gave similar evidence.

Mr. *W. M. MacKay*, analytical chemist, of Leeds, said the fumes were of unpurified coal gas and steam. What he took to be waste ammonia liquid was used to water the red-hot coke when the ovens were discharged. This gave off tar acids and sulphuric compounds which added to the nuisance. These fumes would be deleterious to the crops.

Mr. *James Pettitt*, a neighbouring farmer, testified to the damage done, and said he received a small cheque in 1916 by way of compensation for damage done to his own land by similar fumes. The Company, in giving him the cheque, did not admit liability.

Mr. WAUGH, for the defence, called several witnesses, who said they had been unable to find any trace of damage to the crops by fumes.

Mr. *John A. Foster*, County Analyst for the East Riding, said he inspected plaintiff's land in September last. The condition of the crops was not the same throughout; but where they were poorer, he attributed it to bad drainage.

His LORDSHIP: The poor plants were the nearest to the coke-ovens?

Witness: That is so.

You say it is owing to the bad drainage?—That is so.

In reply to further questions, the witness said he analyzed two samples of soil from the land. Neither sample was alkaline or acid; and after the samples were dry they were found to contain neither ammonia nor lime in sufficient quantities to ensure good crops.

Cross-examined, witness admitted that the vapours from the coke-ovens, if they came over sufficiently, would injure the crops. The leaves of the hedge, too, were burnt; and he could suggest no other cause but the coke-ovens, which might have done the damage.

His LORDSHIP, in giving judgment, said he was satisfied, on the evidence of Mr. Foster and others, that the plaintiff was an unskilful, or, at any rate, a negligent farmer. But to bad farming must be added the effects of the noxious fumes from coke-ovens. He thought from this cause the plaintiff suffered to the extent of £30 damages in 1916, £50 in 1917, and £20 each in 1918 and 1919, a total of £120, for damage to the crops. With regard to the hedge, this had not been properly looked after for years; but the fumes had accelerated its destruction. As it was a bad hedge before, £10 would cover the damage in this direction. His Lordship added that he would not grant an injunction. If the plaintiff made a claim in respect of his 1920 or any future crops, the Court, unless it found a complete difference in his farming methods, might blame his bad farming for the whole of the damage. There would be judgment for plaintiff for £130, with costs.

Alleged Breach of Contract.

In the King's Bench Division of the High Court of Ireland, Dublin, before Mr. Justice Dodd, orders were granted for the discovery of documents by both parties in the case of Wexford Gas Consumers' Company *v.* Great Southern and Western Railway Company of Ireland. The plaintiffs claim damages for alleged breach of contract by defendants in failing to supply cranes or other requisite means for discharging at Rosslare Pier steamships chartered by the plaintiffs, in consequence of which failure demurrage was incurred in the month of March, 1918, and in January and February, 1920.

Fraudulently Obtaining Gas.

It was shown to the Magistrates of Tiverton on Thursday how Lilian Woodberry, married, stole money and gas from the Tiverton Gas-Works. Being, as she said, very hard pressed for money, she broke-open the box of her penny-in-the-slot meter, and took the pence. After this, she used the same penny over and over again for getting her supply of gas. She dropped the penny in the box; and when a further supply was wanted she took out the penny and used it again in the same way. Mrs. Woodberry shut up her house, and refused to let the gas officials enter; but they managed eventually to gain admittance, when the fraud was discovered. Accused was fined £4 or a month's imprisonment.

Continental Union Gas Company, Ltd.

At the meeting of the Company to be held next Tuesday, at Winchester House, the Directors will submit the accounts for the financial year ended June 30, and will report that unfortunately their anticipation of a year ago that the period of readjustment and transition following the war would be of long duration promises to be fully realized, though it was hardly expected then that two years after the armistice there would be so much industrial unsettlement in all the belligerent countries as prevails at the present time. The operations of a company lighting continental cities depend, perhaps more closely than those of any other industry, on coal and transport. Everyone is aware of the gravity of the coal situation at home; but it is much more serious for countries like France and Italy, which are normally dependent upon English supplies. On many occasions during the past year it has been impossible to obtain any coal for export; while the cost, when it was available, greatly exceeded even the high prices paid during the war. There seems little prospect in the near future of any material diminution in the present prices, which are a grave menace to the foreign gas industry, and destructive of British trade interests and markets. The hardships inflicted by these high prices on the nationals of our Allies have done much to diminish the goodwill established through the maintenance of these services during the war, at great labour and sacrifice. In these circumstances, it is not surprising that the Company's large continental holdings have been increasingly unprofitable; and the profit and loss account now submitted contains again only the revenue received during the year from the Company's minor investments. After deducting management expenses and pensions charges, there remained a credit balance of £13,700, being an increase of £4027 over last year. The Directors have transferred £12,500 of this amount to a contingency fund, which will be available for writing-down the book values of some of the general investments, leaving a balance of £1200 to be carried forward. It will not be possible to make any forecast of the ultimate value of the Company's large gas investments until the future position of the industry on the Continent—more particularly in Italy—is better defined, and the French and Italian exchanges have been stabilized.

Trouble from Poor Coal at Greenock.—The Greenock Corporation Gas Department have been seriously concerned as to the poor quality of the coal being supplied. Mr. George Keillor (the Gas Engineer and Manager) has addressed a letter to the Secretary of the Coal and Coke Supplies Committee at Glasgow, stating that recently the supply of both gas and coke nearly came to an end. This state of affairs was attributed to the use of poor unscreened and unwashed material which the Gas Department were obliged to store twelve months prior to the strike. He is afraid there will also be trouble the moment they commence to use the non-coking, dirty, stoney material now being forced upon them for storage purposes. He desired to impress upon the Coal and Coke Supplies Department, and coal proprietors, the necessity for a regular supply of clean gas-making coal of pre-war quality.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices appear in the "London Gazette" of applications by gas undertakings to the Board of Trade under section 1 of the Gas Regulation Act for Orders providing for—(*a*) The repeal of any enactments or other provisions requiring the undertakers to supply gas of any particular illuminating [or calorific] value, and the substitution therefor of power to charge for thermal units supplied in the form of gas; and (*b*) the modification of the statutory or other provisions affecting the charges which may be made by the undertakers by substituting for the maximum [or standard] price per 1000 c.ft. now authorized, with an addition to meet increases in the costs and charges of, and incidental to, the production and supply of gas by the undertakers since June 30, 1914, a maximum [or standard] price per therm (100,000 B.Th.U.).

A copy of the applications made to the Board of Trade, and of all the documents submitted therewith, may be inspected, free of charge, at the gas offices concerned.

Any local authority or person desiring to make representations with regard to the application may do so by letter addressed to the Assistant Secretary, "Power, Transport, and Economic Department," Board of Trade, Great George Street, S.W., and posted not later than the date specified in the notice.

Cheltenham Gas Light and Coke Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 4s. per 1000 c.ft. within the parish of Cheltenham and 5s. per 1000 c.ft. elsewhere; and the prices which they have asked the Board of Trade to substitute for these are 1s. 8d. per therm within the parish of Cheltenham and 1s. 10½d. per therm elsewhere.

Cradley Heath Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 2d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 5d. per therm.

Guildford Gas Light and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 6d. per therm within two miles, and to consumers outside two miles from the gas-works 1s. 7½d. per therm, and outside four miles 1s. 9d.

Maidenhead Gas Company.

The standard prices now authorized in respect of the supply of gas by the undertakers are 4s. and 4s. 3d. per 1000 c.ft.; and the prices which they have asked the Board of Trade to substitute for these are 19d. and 19½d. per therm.

Normanton Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 7d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

GAS SUPPLY IN LONDON DURING THE COAL STRIKE.

The following report has been made by the Public Control Committee of the London County Council on the gas supply of the Metropolis during the recent coal strike.

At the beginning of the strike in October last, the Board of Trade made an Order, entitled the Gas and Coal (Emergency) Order, 1920, with the object of conserving the supply of coal for purposes of gas production. The Order was in operation from Oct. 16 until Nov. 4, and the principal provision was that "gas companies shall not use in the production of gas a greater amount of coal than will suffice to produce gas of a calorific value of 450 B.Th.U. gross per cubic foot."

The undermentioned table shows the average calorific value of the gas supplied by the three large Metropolitan Gas Companies during the strike period, as compared with the average value for the quarter ended Sept. 30, 1920.

Company.	Average Calorific Value for Quarter ended 30th Sept., 1920.	Average Calorific Value for Period of Order.	No. of Tests below 450 B.Th.U.
	B.Th U.	B.Th.U.	
Gas Light and Coke	481·1	460·2	9
South Metropolitan Gas . . .	555·2	549·9	*Nil*
Commercial Gas	489·5	476·5	*Nil*

It will be seen that all three Companies maintained an average calorific value in excess of the maximum of 450 B.Th.U.

In the district of the Gas Light and Coke Company, out of a total of 180 tests, the gas was found on nine occasions to be below the prescribed maximum; the minimum being 435 9 B.Th.U.

The South Metropolitan Gas Company are now under an obligation to supply gas in conformity with their declared calorific value of 550 B.Th.U. gross per cubic foot; and it will be seen that the average for the period under review is almost identical with the declared value.

In the case of the Commercial Gas Company, the figures show that, while economy was exercised, the quality of the gas was not seriously impaired, inasmuch as no test below 450 B.Th.U. was recorded.

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IMPERIAL CONTINENTAL GAS ASSOCIATION.

Distribution of Surplus Assets.

An extraordinary general meeting of the Association is to be held at Winchester House, on the 21st inst., to pass resolutions in respect of the distribution of the surplus assets arising out of a payment by the British Government of a sum on account of the liquidation of the Association's interests in Germany—the amount so received, it is stated, being £4,740,527. This represents a payment on account of the Association's uncontested claims; but a further large payment is expected to be made very soon. The total claims, however, amount to upwards of £16,000,000; and a large proportion of these will have to be dealt with by the Mixed Arbitral Tribunal, and will presumably not be settled for some little time.

The intentions of the Association in regard to the disposal of the sum now available are as follows: The debenture debt consists of £1,154,000, which is redeemable at the option of the Association at any time, on six months' notice, at 105 p.ct. It is proposed to exercise this option to the extent of 60 p.ct. of the debenture stock, which will accordingly be paid off with accrued interest at the price mentioned. The market quotation for the debentures has of late been 91-95. In the second place, it is proposed to make a repayment of 60 p.ct. on account of the ordinary capital, and, in addition, a payment of 20 p.ct., representing accumulated dividends—the last dividend paid by the Association having been in May, 1915. This latter payment of 20 p.ct. will be made out of the reserve, which in the last published accounts (those dated June 30, 1914) stood at £400,000. Income-tax has already been paid on the reserves; and this 20 p.ct. payment will therefore be made tax free. The Directors desire it to be clearly understood that this payment in no way prejudices the Association's claims for reparation under Clause 297 E of the Peace Treaty.

The Czecho-Slovakian Government have now formally recognized the Association's rights to carry on the gas supply concessions which the Association already held many years before the war in a number of towns in what formerly was Bohemia.

GAS-WORKS EXTENSIONS AT BIRMINGHAM.

Important reconstruction work at the Nechells Gas-Works of the Birmingham Corporation is foreshadowed in a report of the Gas Committee.

The scheme refers to the carbonizing plant at the works; and the Committee point out that the inclined retort plant in No. 1 retort-house, installed in 1900, is now worn out, and is in such a condition that it will not be economical further to repair it or to reconstruct it upon old lines. Since the plant was installed, the process of carbonizing coal in vertical retorts has made rapid progress; and to-day the system is capable of producing more gas on a given space of ground than any other proved system. Moreover, it requires less labour, and is not so costly to operate as either horizontal or inclined retorts. The retort-house itself is a substantial building, which is in an excellent state of repair, and will not require replacing for many years to come. Various schemes and several types of plant have been very carefully considered by the Committee, who are unanimously of opinion that the most suitable type to adopt is the continuous vertical plant of the Woodall-Duckham Company. It is essential that the carbonizing capacity of the works shall be increased, in order to meet the continued increase in output; and it will only be possible to do this, on the ground space available, with vertical retorts. Installations of Woodall-Duckham verticals are already in operation at the Windsor Street, Swan Village, and the Coal-Test Works, and have given satisfactory results, including, among other advantages, a much larger yield of gas per ton of coal carbonized than was obtainable by the older and less efficient systems. The Committee, after consulting the Finance Committee, have [as already announced in the "JOURNAL"] accepted the tender of the Woodall-Duckham Company to instal a plant at the Nechells works capable of carbonizing 840 tons of coal per day, for the sum of £563,552; the Company undertaking to complete the first section by the end of June, 1922, and the whole by Nov. 30 of that year.

INADEQUATE MAINS AND SERVICES AT BLACKBURN.

A startling report regarding the Blackburn Corporation Gas Department was made at a meeting of the Town Council last Thursday.

Mr. E. HAMER (the Chairman of the Gas Committee) said he estimated that within the next ten years £200,000 would be required to bring the service up-to-date. An investigation of the department showed an appalling state of affairs. The total length of distributing mains was 130 miles; but of these 50 miles, or 36 p.ct., were only 2 in. and 3 in. diameter. For the greater part they were laid many years ago, when the demands upon them were very much less. They must be replaced as soon as possible by 6-in. and 4-in. mains, according to requirements. Some 7700 house services were only ¾-in. diameter lead pipes, installed possibly when only one or two lights were required. In these days of heating and cooking by gas, they were quite inadequate, and must be renewed with not less than ¾-in. iron pipes. During the last ten years, some 10,000 cookers, wash-boilers, and gas-fires had been installed. Scores of streets had no mains at all—only a small lead pipe doing duty for twenty or thirty houses. The pipe was often only large enough for one house. A stoppage was a very serious matter, as it left the whole street without gas. There were thoroughfares where they did not know on which side the main was laid. Evidence was carefully collected, in order that districts which were being constantly troubled with a poor supply should receive

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special and early attention. In every case it was proved the trouble lay where 2-in. mains and ⅜-in. services were found. One would readily see that no effort had been spared on the part of the management to secure a better supply for the consumer, when it was known that 4927 yards of mains, varying from 4 inches to 12 inches in diameter, and 612 service-pipes had been laid during the past nine months, compared with 6274 yards from 1910 to 1920. Where the work was completed, a decided improvement in the supply had been noted; and in many houses the consumers were now having the use of their cookers, which had been impossible since they were installed. There were over 5000 two-light meters in use; and here, again, was the cause of a loss in pressure. No house should have a smaller meter than three-light, and preferably a five-light one. A number of houses, however, were not arranged to take a larger meter; and some alterations to property would be required in many cases. House fittings and burners left much to be desired; the older houses being fitted-up very largely with ¼-in. piping and every type of cheap burner. It was hoped that an early start would be made with a maintenance scheme, whereby the consumer would benefit in the selection of suitable fittings, and the adjustment of appliances.

COATBRIDGE GAS COMPANY AND THE REGULATION ACT.

Gas Company's Reply to the Town Council.

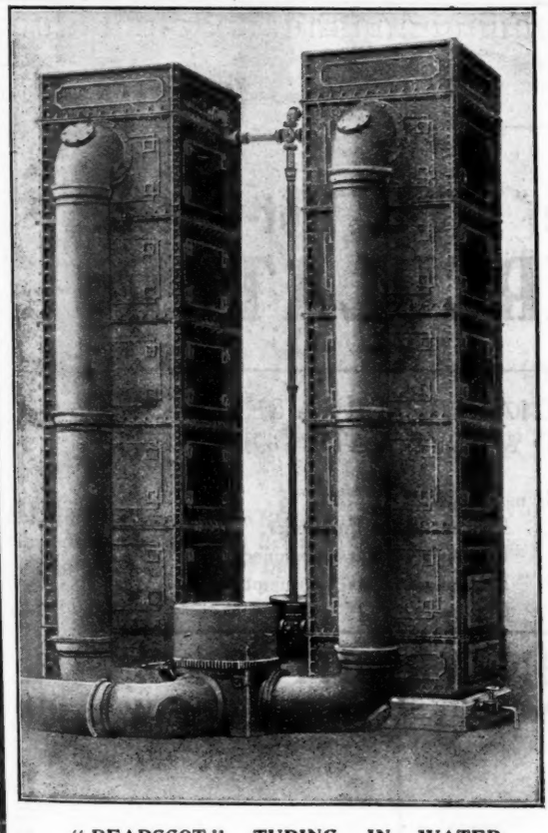
Last week [p. 529] an account was given of a special meeting of the Coatbridge Town Council, at which it was decided, on the recommendation of the Lighting Committee, to lodge an objection with the Board of Trade against the application of the Gas Company for an Order to enable them to charge a price of 14d. per therm for their gas. The Company have since replied to statements made at the meeting, by a letter to the local Press, signed by Mr. A. S. Legat (the Chairman) and Mr. David Lambie (the Secretary).

The Company, among other things, say that the reports which have appeared of the meeting are grossly unfair to them and misleading to the general public. The Company are simply making the application that is prescribed by the Act. If they had not done so voluntarily, they would in due course have been compelled by the Board of Trade to do so. The letter goes on: "Mr. Martin is reported to have stated that, with gas at 2s. 10d., the Company were paying full dividends. This statement is not in accordance with facts. The Provost stated that the basic rate would be done away with. There is no basic rate; but there is a standard price. This standard price may, and no doubt will, be altered, but will not be done away with. Judge Agnew is reported as saying: 'The new standard proposed was 5s. 3d., which meant on the present price of 2s. 10d. an increase of 2s. 5d. before the new sliding-scale would come into operation.' This is simply utter nonsense, as with any new standard price the sliding-scale would operate at once, and exactly in the same way as at present. The Provost talked about candle power. Have the Council or their advisers not yet realized that there is not now any candle-power test, but that for some years gas has been supplied entirely on a calorific standard or test, in terms of a Provisional Order of 1916? The photometer as a means of testing for candle power has been removed from the testing-place, and a calorimeter for testing for calorific value installed in lieu thereof; and the Council surely know, or ought to know, this. Has any member of the Town Council ever seen or studied the Gas Regulation Act, 1920, prior to this special meeting? From the reported discussion this seems very doubtful. Do the Town Council know or understand, and do the consumers realize, that, under the sliding-scale, for every 1d. the price of gas is under the standard price, the shareholders get in the proportion of 1d. of dividend, while the consumers get 7d. benefit? In reading the report of this special meeting, one would think that the whole object of the Gas Company was to take advantage of the consumers; whereas the Company's object is to give the cheapest gas possible commensurate with a fair return to the shareholders, who are surely worthy of some consideration."

BIRMINGHAM GAS CHARGES.

The Birmingham Corporation Gas Committee report that the question of gas charges has again received attention. Since June last, when an all-round increase of 6d. per 1000 c.ft. was made, additional burdens have been imposed upon the department; the principal items being the increased railway rates and wagon-hire charges, which came into operation on Sept. 1. These charges have increased the cost of coal by an average of 3s. 6½d. per ton, which is approximately equal to £140,000 per annum. Other items to be provided for are the additional payments to be made under the new Civil Service Award, the increase in local rates to date, and provision for meeting the heavy cost of the reconstruction of some of the carbonizing plant at the Nechells works. After taking all these items into account, and allowing for the estimated increased income from residuals, provision must be made to cover an increased net expenditure of (say) £150,000 per annum. To do this, the price of gas to ordinary consumers must be increased by 4d. per 1000 c.ft. Consumers using automatic meters will have the quantities of gas supplied per penny reduced in proportion. Those who are supplied with gas-fittings and cookers free will be reduced from 16 to 15 c.ft. per penny; and those supplied with cookers only free, from 18 to 17 c.ft.

The Finance Committee express the opinion that an increase of 4d. per 1000 c.ft. in the price of gas is not adequate. In their judgment the prices charged should be sufficient to provide revenues in anticipation of large works of reconstruction.



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CHARGING BY THERMAL UNITS.

An Electrical Engineer's Views.

The General Purposes Committee of the St. Pancras Borough Council state that notice has been received from the Gas Light and Coke Company that they have applied to the Board of Trade for an Order for repealing enactments or other provisions in reference to supplying gas of any particular calorific value, and the substitution therefor of power to charge for thermal units supplied in the form of gas; the modification of the charges by substituting for the standard price per 1000 c.ft. now authorized, with an addition to meet increased costs since June 30, 1914, the standard price per therm; and the modification of provisions whereby the rate of dividend payable is dependent on the price of gas. The standard price in St. Pancras is 3s. 2d. per 1000 c.ft., and the price to be substituted is 1s. 3·6d. per therm.

In connection therewith, the Committee have received a report from the Council's Chief Electrical Engineer, who says that, as this notice concerns the cost of lighting, and, to a certain extent, the interests of the Electricity Department, he considered it desirable that some information should be available for the Committee. The communication, as it stands, conveys no useful information, inasmuch as it does not state the calorific value of the gas supplied; and, as a consequence, the Committee cannot in any way arrive at the meaning to be conveyed by the expression 1s. 3·6d. per therm. He has made inquiries as to the approximate thermal value of the gas supplied by the Gas Light and Coke Company in their area, and finds that the average calorific value for the September quarter was 491 B.Th.U., and that 204 c.ft. of this gas will equal one therm. Therefore, if the Gas Company charge the full figure of 1s. 3·6d. per therm, the price that they will be able to charge per 1000 c.ft. will be approximately 6s. 4½d. It does not follow, should they obtain the sanction, that they will make this charge; but the Committee should know that they would then secure the power to increase the price of gas in this way to that figure. He believes the modified charge will be beneficial to the consumer, inasmuch as the therm is a measure of the heating value of the gas. In the old system of measuring per cubic foot, the gas might be diluted with a large percentage of air, which would reduce the heating value considerably, and yet the consumer would pay for the air measured instead of the gas. This, with the therm measure, is not so likely to occur.

TRADE NOTES.

[For "Journal" Advertisers.]

New Tully Plants.

Tully gas-plants have been put to work at the following places during the past week: Irthlingborough, East Dereham, Prestonpans, Newport (I.W.), Mirfield, Batley, Otley, Kildwick, Bridgend, Congleton, Haslemere, and Selkirk. A large number of other plants are approaching completion, and will be in operation before the end of this month or early in the new year.

Artistic Shades.

At this time of year, there is always a great demand for shades of every description; and Messrs. J. & W. B. Smith, Ltd., of Farringdon Road, have a very wide range, in the most artistic shapes and styles, for use with gas. Special attention is drawn by them to an attractive Florentine silk shade, with fancy bead trimming, which greatly adds to its effectiveness. This shade is stocked in red, gold, old rose, and moss green. The firm also make-up on their premises glass-bead shades.

Aluminium Sections.

In forwarding a copy of No. 5 of their series of booklets, "Hints on Working Aluminium," which deals with the subject of aluminium sections, the British Aluminium Company, Ltd., of No. 109, Queen Victoria Street, E.C., point out that the use of drawn or extruded sections in place of laboriously fashioned bar or strip is too widely recognized to need advocacy. Aluminium as a material for such sections finds many openings, by reason of its 60-p.ct. weight economy and low first cost, as well as its rustlessness and effective appearance. The range of aluminium sections for which the Company have tools is so large and so continuously increasing, that they find it impracticable to issue the exhaustive list for which they are frequently asked. The booklet now before us, however, gives illustrations and sizes of a few representative shapes. As producers of the metal, the British Aluminium Company are always pleased to study special requirements, and in the event of a standard section not proving suitable, to manufacture the requisite shape.

A "Veritas" Mantle Tableau.

One of the contributions to the procession which was organized in connection with the Advertising Exhibition at the White City was a "Veritas" mantle tableau, arranged by Messrs. Falk, Stadelmann, & Co., Ltd., of Farringdon Road, E.C., which proved to be among the most popular features of the display. The idea of the procession was to bring to life the occupants of the street hoardings, and the characters associated with well-known advertisements. The Falk-Stadelmann tableau (which was mounted on a stripped Halford lorry used for delivering mantles from the works to the firm's central stores) was a reproduction of their new "'Veritas' Housebreaker" poster. A painted sky scene was mounted in the centre of the lorry, running its length, with a platform to support the housebreaker (got-up, of course, in the characteristic costume of the figure in the poster), and a reproduction of the wall in the foreground, with the unbroken "Veritas" mantle, with appropriate loose brickwork *débris*. This was duplicated on the lorry, so as to be seen from either side of the road.

WRIGHT'S "B.T.U." CIRCULATOR
showing the pilot light.

The "B.T.U." Hot-Water
CIRCULATOR
(Heated by Gas).

SPECIALLY TREATED FOR
HARD & SOFT-WATER DISTRICTS

This means :—
Longer life to the Boiler.
Efficiency always maintained.
Economy in Gas Consumption.

JOHN WRIGHT & CO.,
ESSEX WORKS - - BIRMINGHAM.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Dec. 6.

The average values for gas-works' products during the week were: Gas-works coal tar, 117s. 6d. to 122s. 6d. Pitch, East Coast, 175s. to 180s. per ton f.a.s.; West Coast—Manchester, 175s. to 180s.; Liverpool, 175s. to 180s.; Clyde, 180s. to 185s. nominal. Benzole 90 p.ct. North, 3s. 1d. to 3s. 2d.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 3s. 2d. to 3s. 3d. Toluol, naked, North, 3s. 1½d. to 3s. 2½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 2d. to 1s. 3d. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 1d. to 3s. 3d. Creosote, in bulk, North, liquid, 1s. 0¾d. to 1s. 1¾d.; salty, 1s. to 1s. 1d. Heavy oils, in bulk, North, 1s. 1d. to 1s. 2d. Carbolic acid, 60 p.ct., 2s. 7½d. to 2s. 9d. Naphthalene, £37 10s. to £40; salts, £10 to £10 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

The market for these products is very quiet at the moment, with little business passing. Values are fairly well maintained, although there is a distinct tendency towards a lower level. The principal matter of interest during the past week has been the proposed action of some consumers of pitch to form a purchasing agency. The patent fuel manufacturers of the United Kingdom, France, and Belgium have agreed to combine; their object being to bring about a uniformity in the prices of pitch, which have soared to a very high range, with other gas bye-products, owing to the war influence. Undoubtedly consumers have felt these high prices for some time past; but at present there does not appear to be any great relief in sight; and, of course, such a purchasing amalgamation as is proposed could easily lead to similar devices on the part of the other side, and could only have little effect for a while. In the meantime, South Wales buyers, who are probably the principal consumers of pitch, are holding off the market, and there is not sufficient business to test the quotations, which are nominally a shade easier. The market in solvent naphtha is rather flat, although there does not appear to be any serious reduction in prices. Naphthalenes also are easier, especially in the crudes, the lowest kinds of which are probably about £14 per ton. Carbolic acid remains very flat; but creosote is firm—the heavy demand for, and the high values of, fuel oil generally being quite sufficient to maintain prices, although in some quarters it is felt that American values may come down soon. The rest of the market is practically unchanged.

Latest values are as follows:

Benzole: 90% London 4s. 1d., North 3s. 10d. to 3s. 11d.; 50-90% 3s. 6d. London, 3s. 3d. to 3s. 4d. North; crude 60-65%, 2s. 5d. to 2s. 7d.; pure, 4s. 3d. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 117s. 6d.; North, 105s. to 115s. per ton *ex* works. Refined tar, 95s. per barrel (free) on rail.

Pitch: London, 210s. to 220s. per ton f.o.b.; East Coast, 205s. to 212s. 6d. per ton f.o.b.; West Coast, 202s. 6d. to 207s. 6d. f.a.s., with Manchester 220s. per ton, and Glasgow 215s. per ton; South Wales, 220s. per ton.

Solvent Naphtha: London, 3s. 2d.; Provinces average 3s. per gallon.

Crude Naphtha: Naked, 1s. 1d. to 1s. 2d.; North, 1s. per gallon.

Heavy Naphtha: 3s. 4d. per gallon.

Naphthalene: Refined flake, £42 per ton nominal; inferior, £34; crude, £14 to £22 per ton, according to quality.

Toluol: Naked, 3s. 4d. per gallon nominal; North, 3s. 2d.; pure, 4s.

Creosote: London, 1s. 3d. to 1s. 4½d.; North, 1s. 3½d.; heavy oil, 11½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 4d. to 1s. 6d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 8d. per lb., drums extra.

Aniline Salts: 1s. 10d. per lb.

Cresylic Acid: Crude, 3s. 9d.; 95%, 4s. 3d. to 4s. 9d.; 97-99% 4s. 9d. to 5s. 3d.; pure 6s. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 2s. 8d. per gallon; crystals 40%, 8d. per lb. nominal.

Salicylic Acid: Technical, 2s. 4d.; B.P., 3s. per lb.

Xylol: Pure, 5s. 6d.; commercial, 4s. 9d. per gallon.

Resorcin: 12s. to 13s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 3s. per lb.

Sulphate of Ammonia.

There is no improvement in the demand, either at home or abroad, and none is really expected until the turn of the year. Makers are consequently able to take advantage of the present lull to work off their arrears of deliveries. There are some hopes that control of prices will be taken off next spring, when also there is expected to be greater international competition in sulphate of ammonia.

The latest news from America is that producers and dealers there seem to have an anxious time ahead of them, as stocks are reported to be accumulating in rather large quantities. Export demand has practically died out for the time being, very few of the foreign countries being interested.

Illustration shows a CARRON Gas-Heated Steam Radiator fitted with Humidifying pan and outlet.

By Appointment

CARRON

GAS—HEATED **STEAM RADIATORS**

Your consumers want the best radiator—best in service—best in appearance—best in price. Then nothing short of a CARRON will satisfy them.

Avail yourselves of the CARRON Service now by making early application for a supply of the Company's new season's folder, printed with your name and address, free on request.

Write for No. 6R Folder free on request.

CARRON COMPANY

Works
CARRON, STIRLINGSHIRE
Branch Works
Phœnix Foundry, SHEFFIELD

Showrooms:—LONDON—(City) 15, Upper Thames Street, E.C. 4.; (West End) 50, Berners Street, W.1. LIVERPOOL—Redcross Street. GLASGOW—Buchanan Street. EDINBURGH—George Street. BRISTOL—Victoria Street. BIRMINGHAM—Corporation Street.

Offices: MANCHESTER—14, Ridgefield, and NEWCASTLE-ON-TYNE—15, Prudhoe Street.

An Association of Pitch Consumers.—It was decided, at a meeting of patent fuel manufacturers of the United Kingdom, France, and Belgium, to form an Association of Pitch Consumers, for the purchase of pitch. It is understood that the combine will be a large one, and of an international character. The main object is to bring about uniformity in the price of pitch.

Difficulties at Batley.—When complaints were made at the Batley Town Council meeting last week as to the poor gas supply in the town, it was admitted on all hands that the Gas Department were labouring under great difficulties, owing to having to depend on old and worn-out plant; the additional new water-gas plant being yet incomplete. But it was pointed out by Mr. F. Oates that, if the Council had bled the department of their profits in the past to help other departments, the Council had only themselves to blame for the present state of affairs. It was stated that the new plant should have been ready in September. A generator was now ready, though the full difficulties would not be overcome this year.

Gas Exhibition at Leeds.—The Leeds Corporation Gas Committee have decided that, for the purpose of demonstrating the hygienic value of the use of gas for domestic and power purposes, arrangements shall be made for the holding of a gas exhibition in the city at an early date next year.

Fatality at the Bradford Gas-Works.—A verdict of "Accidental death" was returned at an inquest at Bradford on George Dadd, a labourer under the Bradford Corporation, who had been killed by a fall of bricks while working beneath an archway of a disused retort-bench at the old Eccleshill Gas-Works. Mr. C. T. B. Roper, Mains Superintendent, said Dadd's duties at Eccleshill were to look after the syphons and valves; but in spare time he assisted in the dismantling of brickwork of some disused retorts. He was not expected to do this work alone; and it was not necessary that he should go underneath the arches. Mr. Charles Wood (the Gas Engineer) said it was not suggested that Dadd had done anything he ought not to have done. It was possible he went underneath to bring out a retort.

STOCK MARKET REPORT.

THE week just closed on the Stock Exchange, though an improvement on its predecessor, did not run with unimpaired smoothness. The opening was very dull, and threatened a continuation of weakness. But Tuesday brought brighter views; the pressure to liquidate being much reduced though not wholly at an end. On Wednesday there was a moderate, but steady, improvement. Next day there was a slight check; but on Friday the general position was better again.

In the gilt-edged market movements were irregular, some lines doing fairly well; but Home Government issues were rather weaker, the big four showing the following prices on Friday—viz., Consols 43 11/16-44 3/16, War Loan 82 15/16-83 1/4, Funding 66-66 1/8, Victory 73 1/8-73 1/2. Bonds rather lost ground; but Corporation issues were in demand. Home Rails were mostly dull, but steadied before the close, Canadians were fair; Argentines unsteady.

The Foreign Market was weak generally; French and Greek being most notable in this respect; but Chinese, Japanese, and Egyptian were supported.

The Miscellaneous Market had a smoother week than the one before. Oils made a good recovery upon the rush to sell being abated. Rubbers continued under a cloud. Textiles and Iron and Steels were better, and Insurance was firm. Breweries were inquired for.

Business in the Gas Market was on a fair scale, taking the aggregate; but about three-fourths of it was in Gas Light and Coke and Imperial Continental. The general feature displayed was steadiness. Few variations in quotation occurred, and these were mostly improvements. In the London Companies, South Metropolitan rose 1, but Gas Light and Commercial were unchanged. The centre of attraction was Imperial Continental. It was done at 131 on Monday; but on Tuesday an announcement was issued that the Company had received from the "Enemy Debts" office 4 3/4 millions sterling on account of liquidation of its German assets. This sent the stock up to 146, a rise of 9 in quotation. The debenture stock also advanced.

Bargains done for cash during the week were as follows: On Monday Brentford "B" 50, 50 1/4, 50 1/2, Gas Light ordinary 52 1/4, 52 1/2, 52 3/4, 53, 53 1/4, 53 1/2, ditto maximum 37 1/4, ditto preference 57, Imperial Continental 131, 131 1/4, 132, 133, 134, ditto debenture 92, Oriental 96, Primitiva 10s., ditto preference 19s. 6d., 21s., South Metropolitan 57 3/4. On Tuesday, Gas Light ordinary 53, Imperial Continental 131 1/2, 132, 134, 140, 141, 142, ditto debenture 91, 93 1/2, South Metropolitan 58 1/2, ditto debenture 47. On Wednesday, Commercial debenture 45, Gas Light ordinary 52 1/2, 53, 53 1/4, 54, ditto debenture 46, Imperial Continental 143, 143 1/4, 143 1/2, 144, 144 1/4, 145, 145 1/2, 145 5/8, 145 3/4, 146, ditto debenture 94, 95, 95 1/2, Primitiva preference 20s., 20s. 6d., South Metropolitan 57 1/4, 58 1/4. On Thursday, Gas Light ordinary 52 1/2, 52 3/4, 53 1/8, ditto maximum 38, ditto debenture 46 1/2, Imperial Continental 143, 143 1/4, 143 1/2, 144, 144 1/2, 144 3/4, 145, 145 1/2, Primitiva preference 20s. 3d., South Metropolitan debenture 46 1/2, Kingston-on-Thames 48 1/2, Utah 5 p.ct. 1st mortgage 73. On Friday, Bombay 4 1/2, Bournemouth "B" 8 3/4, 9, Gas Light ordinary 52 1/4, 52 1/2, 53 1/4, 53 1/2, Imperial Continental 143, 143 1/2, 144, 144 1/2, 145, 145 1/2, ditto debenture 94 1/2, South Metropolitan 58, South Suburban 57 1/2, Wandsworth and Wimbledon 46, 46 1/2.

In the Money Market, the close of the month brought about a cessation of the previous demand; and, supplies being abundant, the position became quite easy. Silver had a sharp fall, but recovered partially. The Bank rate is 7 p.ct., fixed on April 17 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref.	...	56—61	...
1,551,868	,,	Oct. 14	2½	3 1/18%	Alliance & Dublin Ord.	59—64	38—43	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6¼	4¼—4¾	4¼
100,000	5	Aug. 12	16	5%	Bourne- (5 p.c.	...	8—9	...
383,110	10	,,	7	7%	mouth Gas (B 7 p.c.	15—15½	8¼—9¼	8¼—9
115,000	10	,,	6	6/-	and Water (Pref. 6 p.c.	13¼—14	7¾—8¼	...
162,065	—	June 25	—	4%	(4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid.	261—266	50—55	...
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	50—50½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	60—63	...
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig.	208—213	110—120	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	75—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 15	12½	10%	British	44—45	20—22	...
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	39—42	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1¼—2¼	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref.	4—6	5¼—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	...
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	...
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	45
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	25—30	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—50	...
51,600	,,	Aug. 27	14½	10 1/2%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	11¼	7½%	Croydon B and C 7 p.c.	..	90—100	...
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6—7	...
16,298,975	Stk.	July 29	4/17/4	30/-	Gas (4 p.c. Ord.	98—102	51—54	52¼—54
2,600,000	,,	,,	3½	26/3	Light (3½ p.c. max.	76—79	36—39	37¼—38
4,062,235	,,	,,	4	4%	and (4 p.c. Con. Pref.	96—99	55—58	57
4,674,850	,,	June 25	3	3%	Coke (3 p.c. Con. Deb.	72½—74½	45—48	46—46½
130,000	,,	Dec. 11	10	10%	(10 p.c. Bonds.	...	...	...
82,500	,,	Sept. 15	5	3½%	Hastings & St. L. 5 p.c.	...	53—58	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	37—39	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8¼—9¼	...
86,600	Stk.	Sept. 15	9	5½%	Hornsey 7 p.c.	...	87—89	...
137,000	,,	Aug. 12	7½	4½%	Ilford A and C	151—154	79—84	...
65,780	,,	,,	6½	3½%	Do. B	115—118	64—69	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb.	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	142—147	141—146
1,235,000	,,	Aug. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	92—97	91—95½
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c.	119—121	80—85	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. {A. / B.	211—213 / 146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3½%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4¾	1¾—2¼	...
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne (4½ p.c. Deb.	99—101	86—93	...
541,920	Stk.	Nov. 26	4	6%	Monte Video, Ltd.	11¼—12	68—73*	...
1,875,892	,,	July 29	4½	3½%	Newcastle & Gatsh'dCon.	98½—99½	60—61	...
529,705	,,	June 25	3½	3½%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12¾—13¼	...
55,940	10	,,	7/14/0	52½%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	Nov. 26	8	8%	Oriental, Ltd.	117—122	96—99*	96
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7¾	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	⅜—⅝	10/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4¾—5	1/16—1⅛	19/6—21/-
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	66—69*	...
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	38—43	...
150,000	10	Sept. 30	6	6/-	San Paulo (6 p.c. Pref.	10½—11	6½—7½	...
125,000	50	July 2	5	5%	(5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	60—63	...
209,984	,,	,,	10	4%	Do. B	222—224	59—61	...
523,500	,,	,,	10	3½%	Do. C	220—222	59—61	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. Ord.	111—113	57—60	57½—58½
250,000	,,	July 14	—	5%	Do. Red. Pref.	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	46½—47
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	56—61	57½
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	65—70	...
647,740	,,	Nov. 12	7½	3½%	Southampton Ord.	99—102	55—58	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3½%	Tottenham (A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	2½%	District (B 3½ p.c.	115—117	50—55	...
181,255	,,	June 10	4	4%	(4 p.c. Deb.	87—89	57—60	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3½%	Tynemouth 5 p.c. max.	108½—109	69—71	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 27	8½	47/6	Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6¾	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	46—46½
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk.	66—69	44—47	...

* Ex Div.

Gas for Stockholders Only.

A curious proposal in connection with the municipalization of a gas undertaking has been made at Port Arthur (Texas). The story goes back to the time of the war, when misfortune fell upon the gas company. Since then the plant has been run by a Committee of Consumers, who have been levying a rate of something like $3 per 1000 c.ft., payable in advance. Lately the ratepayers were asked to authorize a bond issue, to raise money to buy the plant for the city; but this they declined to do. Now a Citizens' Committee has been organized, to buy the plant and operate it—for this purpose selling stock, and supplying gas only to stockholders. The plan which appears generally to find favour is to supply the gas at cost price, *plus* interest on the investment. It is calculated that the purchase of the plant in this way by the citizens could be financed merely by the cost that would otherwise be incurred for purchasing the necessary equipment, &c., for changing-over from gas to other fuels. While the plant as it stands is worth about $300,000, and to duplicate it would cost much more, it can be had for $115,000. With some additional expenditure, it can be made thoroughly efficient; and it is thought that, at the present cost of materials, gas can be manufactured and distributed with a fair profit at $2 per 1000 c.ft., or possibly less. As a matter of fact, the Citizens' Committee are at present manufacturing gas at a cost of $1·45 per 1000 c.ft. The Chairman of the Committee is Mr. G. M. Craig, who points out that the fate of the former company has no bearing upon the future of the enterprise. Their misfortunes were due to war-time conditions, and to no fault of their own. Port Arthur will not remain long without a gas system; for there is probably not a city in the United States with the same population which does not offer this fuel to its prospective citizens or business enterprises. If the consumers will not buy the plant, some private corporation will do so.

In the Burnley Town Council, Mr. Lynch objected to the expenditure of £600 on the provision of oak panelling for the new show-room of the Gas Department, stating that they did not find such expensive wood panelling in ordinary business premises. His protest, however, was not effective.

At an exhibition last week at No. 72, Buckingham Palace Road, in connection with the National Training School of Cookery and other Branches of Domestic Economy, it was demonstrated that the cookery ranges from one-saucepan instruction to high flights of the art. As an example of the simple system, a piece of fish, rice and milk, stewed prunes, beans, and potatoes, all cooked together with one saucepan on a gas-ring, were shown. The prunes and rice were in separate jars, the beans in a bag, the potatoes loose, and the fish in a plate on the top of the saucepan covered by the lid.

The Reading Gas Company are making an issue at par of £40,000 of 7 p.ct. debenture stock redeemable at par on Jan. 1, 1931. Applications should be sent to the Company by Monday, the 20th inst. The capital is required to meet the cost of extensions to the Company's manufacturing plant.

For about half-an-hour last Wednesday evening, there was a failure of the electric light in certain parts of the west-end of London. The cause of this inconvenience was the breakdown of a portion of the plant at the Tower Street sub-station of the Metropolitan Electric Supply Company's system.

A man, 88 years of age, living at Didsbury, who kept a gas-ring by his bedside for the purpose of heating liquid food, was found dead from gas poisoning; and at the inquest it was suggested that the pan on the ring had boiled over, putting out the gas. The door and windows of the room were open.

Last Thursday afternoon the members of the Students' Engineering Society of the University of Sheffield paid a visit to the Neepsend works of the Sheffield Gas Company, being conducted round by Mr. H. B Holliday. The party spent a very interesting and instructive afternoon; and the visit was much appreciated by the members.

At a Scarborough inquest, last week, it was shown that Arthur Robert Edmunds had been found dead with his head in a gas-oven Over the front of the oven a towel had been hung, to keep the gas in. When found he had apparently been dead for some days. He was understood to be an author of private means, who had come to England after service in the war as a Canadian cavalry officer. A verdict of "Suicide while of unsound mind" was returned.

On behalf of the Bognor Gas Light and Coke Company, Messrs. A. & W. Richards are offering for sale by tender £5050 of 7½ p.ct. debenture stock, to be redeemed at par on Dec. 31, 1930. The minimum price of issue is par; and tenders have to be sent in by Friday morning, the 17th inst. The capital now being raised will be applied in repaying money already obtained from the Company's bankers for extensions of plant rendered necessary to cope with the increasing demands for both gas and electricity.

Considerable interest is being manifested in the national conference of representatives of Joint Industrial Councils and Interim Reconstruction Committees, which is to be held to-day at the Ministry of Labour, Montagu House, Whitehall, in connection with the proposed organization of a National Whitley Association. The conference will open with addresses by the Rt. Hon. J. H. Whitley, M.P. (Deputy Speaker of the House of Commons) and the Rt. Hon. Dr. T. J. Macnamara (Minister of Labour). The Rt. Hon. G. H. Roberts, M.P., and the Rt. Hon. J. H. Whitley, M.P., are the Joint Presidents of the Industrial League and Council, and have done much to help forward the Whitley movement.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

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(See p. 602.)

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LIGHTING STORES FOR THE YEAR 1921-22.

TENDERS are invited, in duplicate, for the Supply and Delivery of LIGHTING STORES for Public Street Lamps and Municipal Institutions for Twelve Months from the 1st of April, 1921. Complete Specification and Descriptive List of Stores required, together with Tender Form, in duplicate, may be obtained from the Central Record-Keeper, Central Municipal Office Buildings, Calcutta, on payment of Rs. 2 only.
The principal Articles required are: (*a*) INVERTED INCANDESCENT GAS-MANTLES for Street Lighting; (*b*) INVERTED INCANDESCENT GAS-BURNERS complete; (*c*) GLASS CYLINDERS for Inverted Burners; (*d*) GLASS PANES for Street Lamps; (*e*) BRASS NIPPLES of sizes for Gas Burners. Samples are required where stated in the list; and these must be addressed to the Superintendent of Stores to the Corporation, 149, Lower Circular Road, Calcutta, carriage paid.
Tenders must include Delivery free of all Charges at the Corporation Stores, Calcutta, including Duty and Insurance against Breakages and Marine risks. The Corporation do not bind themselves to accept the lowest or any Tender, and will be at liberty to accept the whole or part of a Tender.
Tenderers may quote for any or all of the items mentioned in the list.
Payment will be made when delivery is accepted.
Tenders must be addressed to, and will be received by, the Deputy Chairman of the Corporation up to 2 p.m. on Tuesday, the 22nd February, 1921, when they will be opened in the presence of such Tenderers as may be present.
Tender, in duplicate, must be enclosed in a sealed cover and superscribed "Tender for Lighting Stores for 1921-22."
No Tender will be considered unless accompanied by a remittance to the extent of 2½ p.ct. on the total value of such Tender.
Tenderers must abide by the rules in regard to Tenders in vogue in the Corporation, and are required to submit Tenders in duplicate on the Corporation Form above referred to.
The rates quoted in the Tender will remain open for acceptance for a period of two months from the date of opening the same.

J. C. MUKERJEA,
Secretary to the Corporation.

Central Municipal Office,
Nov. 11, 1920.